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Wellbeing of Children: Early Influences

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April 2013

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Abstract

This project investigated the factors and processes promoting the wellbeing of young children growing up in conditions of poverty, hardship and family instability using data from a large-scale contemporary UK data source, the Millennium Cohort Study. Children's wellbeing was conceptualised as a multidimensional construct, embracing cognitive, social, emotional and behavioural adjustment by age 5. Age 5 was chosen as the focal point due to its proximity to school entry and the importance of early functioning for later attainment and wellbeing. In a first step we assessed the effect of income poverty (defined as families living below 60 per cent of the equivalised median household income) on children's cognitive, emotional, social and behavioural adjustment. We then took into account a number of other adverse factors, such as family instability, family demographics, housing, and area deprivation, assessing their independent and combined risk effects. In addition we examined the role of potential protective factors and processes in reducing the adverse implications of exposure to multiple risks.

We found that poverty, in particular persisting poverty, was significantly associated with poorer academic attainment and behavioural adjustment in young children. Verbal skills were most affected, as were levels of conduct problems, hyperactivity, and peer problems. Least affected was the manifestation of pro-social behaviour.

Family structure and instability showed an independent risk effect in particular regarding behavioural adjustment, although the experience of family instability did not fully explain the association between poverty and children's adjustment. Poverty was associated with a number of other socio-economic risks, and the combined effect of these risk factors on children's adjustment was stronger than individual effects, especially regarding behavioural adjustment.

We identified a number of potential protective factors, supporting effective functioning even in the face of severe socio-economic hardship; these included indicators of developmental health, parent-child interactions, child care and neighbourhood characteristics. These results were obtained even after allowing for a number of other socio-economic risks (e.g. low parental education level, family instability, parental worklessness and housing conditions).

This evidence provides limited support for a policy agenda targeted *only* at income poverty. Although poverty was significantly associated with indicators of child wellbeing, it explained only a small amount of variance. We cannot say that poverty per se had caused poorer outcomes but rather the complex needs and numerous socio-economic risks faced by poor families. Our report cannot determine whether we should tackle the underlying *sources* of these risks (e.g. poor parental education, worklessness, etc.) or deal directly with the *consequences* of these risks (e.g. poor achievement and lower levels of psycho-social functioning). What our research does clearly show is that policy needs to address the multiple risks that children and their families face.

Contents

Executive summary

What were the main aims of the research?

The main aims of the research were threefold:

a. to investigate the experience of poverty and family instability in families with pre-school children in the UK in the early years of the 21st century

b. to determine how household poverty and family instability impact on children's cognitive, social, emotional and behavioural development (all understood to be indicators of children's wellbeing)

c. to gain a better understanding of factors and processes that promote the wellbeing (i.e. positive adjustment across domains) of young children, especially those growing up in circumstances of multiple disadvantage (comprising family poverty, family instability, and other associated demographic risk factors)

What data were used?

The research is based on secondary analysis, drawing on data collected for the Millennium Cohort (MCS), an on-going longitudinal study following the lives of over 18,000 children living in the UK. We focus on families with preschool children

How was children's wellbeing measured?

Children's wellbeing was assessed through direct measures of cognitive ability, including verbal and nonverbal skills of the children at age 5 (3 subscales of the British Ability Scales (BAS)) along with mother-reported behaviour problems of the child capturing conduct problems, hyperactivity, emotional problems, peer problems and prosocial behaviour using the Strength and Difficulties Questionnaire (SDQ).

How was family poverty measured?

We measured poverty at the household level at child ages 9 months, 3 and 5 years. Following the OECD definition of poverty, we identified families living in relative poverty on the basis of whether their household income fell below the poverty line (60% of the median equivalised net household income) at each age. We also created a variable that indicated how many times the family was in poverty, ranging from 0 to 3.

How was family instability measured?

We assessed family instability using information about the mothers' relationship status (married, cohabiting, single) at child ages 9 months, 3 and 5 years. The repeated assessment of relationship status provides information on stability and change in family structure during the first five years of the child's life.

What were the main findings?

A summary of key findings is presented below.

1. *How many children lived in poverty?*
   The majority of parents with young children (about 60%) did not experience poverty at any of the three assessments (at 9 months, 3 and 5 years), about a fourth moved in and out of poverty, and about 1 in ten experienced persistent poverty.
2. *What were the characteristics of families experiencing repeated or persisting poverty?*
   The experience of poverty, in particular repeated and persisting poverty, was associated with parental worklessness, living in rented housing, overcrowding, area deprivation, single parenthood, family instability, and low levels of parental education.
3. *Were there regional differences in poverty exposure?*
   We found variation in rates of poverty across the regions of the UK. Rates of persistent poverty were highest in the northern regions, Wales, London and Northern Ireland. Families in the East and South of the UK experienced less poverty than those in the other regions, and were also less likely to experience area deprivation, worklessness, single parenthood and low education.
4. W*hat was the association between poverty on children's wellbeing across a range of developmental domains?*
   We found that the experience of material hardship in early life was associated with decrements in the cognitive development and psycho-socio-emotional adjustment of children. Verbal skills, levels of conduct problems and hyperactivity, and problems with peers were particular areas of vulnerability. Poverty was also associated with maternal distress and less effective parenting, both of which, in turn, showed links with child adjustment.

5. *Does the timing and duration of hardship matter?*

   Repeated exposure to poverty was a crucial risk factor for children's adjustment across domains, as was exposure to poverty during the first year of life (which showed an independent risk effect over and above that of persistent poverty).

6. *Do family structure transitions during a child's first five years moderate the associations between poverty and child adjustment?*

   Children growing up in stable two-parent families (nearly 80% in our sample) were less likely to experience poverty than children experiencing a family break-up. However, children growing up in stable single parent families (about one in ten) experienced the highest rates of poverty. Poverty and family instability showed independent risk effects on cognitive and psycho-social adjustment, with poverty showing slightly stronger associations with cognitive development, and family disruption being more salient for emotional and behavioural adjustment. Family structure transitions did somewhat moderate the association between poverty and child adjustment, especially regarding behaviour adjustment, yet did not completely remove the association. The poorest child outcomes were associated with the accumulation of risk factors and their combined effect, especially regarding behavioural adjustment

7. *Do aspects of mothers' mental health and parenting behaviours mediate the associations between family hardship and child adjustment?*

   Maternal mental health and parenting behaviours played a significant role in children's cognitive and psycho-social adjustment, over and above the influence of family hardship. Although including indicators of these factors in our models reduced the association between family hardship and child adjustment, it did not fully explain it, pointing to partial mediation.

8. *How can we reduce the negative impact of family adversity (poverty and family instability)?*

   Our findings suggest that experiences in the family and wider social environment as well as characteristics of the child can reduce the risk associated with multiple socio-economic adversity. In particular, we found significant beneficial effects associated with indicators of children's physical health (birth weight, developmental milestones) as well as warm and supportive parent-child interactions (breast feeding, affectionate relationship, reading to the child, visits to the library, regular meal and bed times), and characteristics of the neighbourhood (good area for raising kids) which were associated with higher levels of cognitive and behavioural adjustment despite the experience of hardship. These factors reduced the risk effects associated with family socio-economic hardship yet did not eliminate them. Furthermore, their impact was rather small. In addition we found distinct protective factors, that facilitated adjustment in high risk conditions. In particular the

experience of both formal and informal child care was associated with effective functioning regarding cognitive and behavioural outcomes among high risk children. Regarding cognitive ability we also found that having family and friends live nearby and living in a safe area were protective, and for behaviour adjustment we found significant roles for early physical development, maternal mental health and the quality of parent-child interactions. Aiming to improve children's wellbeing it is therefore necessary to take a holistic approach which implies tackling persisting childhood poverty as well as a number of other interlinked risk factors, such as parental worklessness, the housing conditions of families with young children (overcrowding and social housing were identified as significant independent risk factors over and above poverty exposure), area deprivation, and parental education. In addition investments should be made in services that integrate child care, education, health and improvements to local infrastructure.

1 Introduction

Because children have only one opportunity to develop normally in mind and body, the commitment to protection from poverty must be upheld in good times and in bad. A society that fails to maintain that commitment, even in difficult economic times, is a society that is failing its most vulnerable citizens and storing up intractable social and economic problems for the years immediately ahead.
(UNICEF, 2012)

The aims of this study were to examine the experience of poverty and family instability in families with pre-school children and to determine how household poverty and family instability impacts on children's cognitive, social, emotional and behavioural development. Drawing on evidence from the UK Millennium Cohort Study (MCS) the research focused on preschool children to gauge early potential scarring effects from exposure to household poverty and other associated risk factors. We were also interested in uncovering the role of potentially protective factors and processes that can promote the wellbeing of young children, especially among those growing up in circumstances of multiple disadvantage (comprising family poverty and family instability).

In particular we aimed to answer the following research questions:

1) To what extent is the experience of material hardship (e.g. income poverty) during a child's first five years associated with the child's wellbeing across a range of developmental domains (social, emotional, behavioural and cognitive)?
2) Does the timing and duration of hardship at age 9 months, 3 and 5 years matter?
3) Do family structure transitions during a child's first five years explain these associations?
4) Do aspects of mothers' mental health and parenting behaviours explain these associations?
5) Does early child adjustment mediate these associations?
6) Do aspects of social networks and neighbourhood characteristics mediate these associations?

Our study adds to the existing evidence base on these issues in multiple ways. First, we examine the relative and combined impact of poverty and family instability on children's outcomes by age 5, controlling for other interlinked risk factors. Second, we use longitudinal data to take into account the duration of poverty and changes in family structure. Third, we investigate a wide range of outcomes (including cognitive, social, emotional and behavioural adjustment); and fourth, we examine potential protective factors that might reduce the risk effects of poverty and associated risk factors on children's outcomes.

1.1. Child Poverty

Most children in the United Kingdom have secure and prosperous lives, yet there remain a significant number of children who live in poverty, often facing multiple adversities. The 2007 United Nations report on the well-being of children in rich countries (UNICEF, 2007) suggests that at the turn of the millennium children growing up in the UK and the US were suffering greater deprivation than those in most other wealthy countries. The situation has since improved, although the UK, the US and Canada still have among the highest rates of infant mortality (UNICEF, 2013). In the UK, the *Child Poverty Act* of 2010 has set legally binding targets for reducing child poverty, which was defined as living on an income below 60% of the median equivalised net household income. By 2020, the relative child poverty rate is to be halved to no more than 10%. But as the Act came into force, a major economic crisis was already beginning to threaten social protection programmes. Child benefits, for example, have been frozen for three years – meaning that in real terms they will fall in value. Child tax credits and other programmes designed to protect the poorest children have been cut back (Eurochild & Ruxton, 2012). Although the child poverty rate is currently thought to be stable, it is predicted to be rising again in 2013, and according to a report from the Institute for Fiscal Studies (Brewer, Browne, & Joyce, 2011) it is very likely that the progress in reducing child poverty of recent years will be thrown into reverse. The impact of poverty on children's wellbeing thus remains a burning issue. Given the persistence of extreme poverty even in highly developed societies, it is essential that we learn more about the impact of socio-economic adversity on children's early development, and identify factors that promote successful development.

There is now consistent evidence of the harm to the physical and mental health and wellbeing of children that can be caused by family poverty and adverse living conditions (Bradley & Corwyn, 2002; Bradshaw & Mayhew, 2005; Engle & Black, 2008). The effects of family hardship on child development appear to be strongest during the pre-school and early school years (Brooks-Gunn & Duncan, 1997; Feinstein, 2003; Rijlaardam et al., 2013; Schoon, 2006), and the early years have also been identified as a critical window of opportunity for interventions aiming to build children's competences and support their cognitive and social development (Eisenstadt, 2011; Gross, 2008; Heckman, 2006; Clyde Hertzman et al., 2010; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2010). The association between family hardship and early child development is well documented (including in reports from the Millennium Cohort Study: http://www.cls.ioe.ac.uk/; see also Dearden, Sibieta, & Sylva, 2011; Goodman & Gregg, 2010; Gregg, Propper, & Washbrook, 2008; Washbrook, 2010). There is however less understanding of the ways in which the experience of socio-economic hardship influences families and children's development. There are some studies examining the role of family hardship in shaping family interactions and the associated impact on developmental outcomes in young children (Kiernan & Mensah, 2008; Linver, Brooks-Gunn, & Kohen, 2002; Robila & Krishnakumar, 2006; Schoon,

Hope, Ross, & Duckworth, 2010; Waldfogel & Washbrook, 2010). There is however still little understanding of the role of family instability over and above other potential risk factors.

1.2. Family Instability

Families are considered to be key in providing supportive, nurturing and stimulating environments for their children (DfE, 2011; HMTreasury, 2010; O'Connor & Scott, 2007; Tickell, 2011). For example, in the Families and Relationships Green Paper published in 2010 families have been identified as the biggest single influence on child outcomes (DCSF, 2010). Family interactions and poverty are intimately connected because families in poverty find it harder to support and bring up their children to the best of their ability. Poverty affects families economically, socially, as well as on an emotional level. Economic hardship has, for example, been associated with increased parental distress and discord, as well as reduced capacity for parenting and greater risk for relationship break-up (Conger, Ge, Elder, Lorenz, & Simons, 1994; Kiernan & Mensah, 2008; Linver, et al., 2002; Schoon & Hope, 2007; Schoon, Jones, Cheng, & Maughan, 2011). In addition, changes in living arrangements in recent decades have resulted in high rates of family instability for mothers and their children (Amato, 2005a; Kiernan, 2008; McLanahan & Percheski, 2008). The prevalence of both nonmarital births and cohabitation has increased, and the divorce rate has remained at a high level. Historically, research in this area has focused on the association between child wellbeing and family structure as a state (i.e. marriage, cohabitation, divorce etc). Despite the high profile of 'family'-related issues in policy debate, much less is known about the correlates and consequences of transitions in family types, especially among non-married parents (Collishaw, Goodman, Pickles, & Maughan, 2007; Fomby & Cherlin, 2007; Osborne & McLanahan, 2007). Changes in family structure may affect the wellbeing of mothers and children through a wide variety of mechanisms including inter-parental conflict, lack of support, associated life changes (such as residential moves) – as well as through a much increased likelihood of economic difficulties. Family instability has now been recognised as a salient risk factor affecting parenting effectiveness and children's adjustment especially during early childhood (Amato, 2005b; Brown, 2010; Conger, Schofield, Conger, & Neppl, 2010; McLanahan & Percheski, 2008). The effects of family instability on child adjustment are however less well researched than poverty effects. Indeed, there is no consensus about how family instability should be conceptualised and measured (Brown, 2010). This study aims to close the evidence gap, examining the associations between poverty and family instability, and their combined impact on the cognitive and behavioural adjustment of preschool children in a large and nationally representative study.

1.3. Multiple interlinked risks

There is a concern that the apparent impact of family poverty or family instability on child outcomes might be spurious, reflecting instead their associations with a number of other

problem factors, including family socio-demographic characteristics (such as parental education, employment status, number of children in the family, age of the mother), housing conditions, and area deprivation (Bradshaw & Holmes, 2010b; Bradshaw & Mayhew, 2005). It is therefore important to control for these factors. For example, poverty is increasingly concentrated in certain subgroups of the population and in certain areas (Gregg & Wadsworth, 2001). Workless households are significantly more likely to experience poverty than households in which at least one adult is in work (ONS, 2010). Indeed, comparing poverty rates of children of jobless couples in Europe, Harkonen (2011) found that in the UK and Ireland these were higher than the average in other countries, reaching above 50%. Hence it is important to allow for these other linked risk factors when modelling the relationship between family poverty and instability and children's outcomes.

Certainly the existing evidence suggests that the relationship between any single risk factor and subsequent outcomes tends to be weak. Usually many risks are involved in determining an outcome, and serious risk emanates from the accumulation of risk factors (Garmezy, 1991; Evans, 2004; Rutter, 1981, 2009). It is therefore important to examine multiple risk factors in order to more accurately predict and understand developmental outcomes. However, there is often a lack of precision regarding the identification of risk factors, due to their complex and interlinked nature. Many multiple risk indicators are too broad and heterogeneous to enable a better understanding of the actual processes producing the risk. In our analysis we therefore focus on a range of socio-demographic risks, taking into account family structure and stability, as well as maternal age, education, social class and employment status, , housing conditions, and area deprivation - all of which have been associated with both poverty and child outcomes and reflect more accurately the everyday experiences of families living in poverty.

1.4. Timing and duration of risk effects

Most previous studies have looked at poverty as a state, without taking into account that households may be moving in and out of poverty over time. In our analysis we therefore differentiated between families that never experienced income poverty during the period of observation, those who moved in and out of poverty, and those that were persistently poor at three years of observation (see also Bradshaw & Holmes, 2010; Dickerson & Popli, 2012; Schoon, Jones, Cheng, & Maughan, 2012).

1.5. Risk and Resilience

Not all children are similarly affected by the experience of poverty and hardship. Some individuals seem able to 'beat the odds' and to function effectively despite the experience of adversity (Garmezy, 1991; Masten, 2001; Masten, 2009; Rutter, 1987; 2006; Schoon, 2006, 2012; Werner, 1993). Effective functioning has been defined in several ways, ranging from the absence of psychopathology to the mastery of developmental tasks encountered at different life stages (Masten, 1994; Masten & O'Dougherty Wright, 2009). Here we

conceptualise effective functioning under adverse conditions as normative functioning within or above the expected average for a normative cohort. We thus do not focus on extraordinary achievements – but 'ordinary magic' (Masten, 2009), normal cognitive, socio-emotional and behavioural functioning in the face of adversity. We study cognitive, socio-emotional and behavioural adjustment by age 5, as these domains have been identified as crucial indicators of developmental health or wellbeing (Hertzman, 1999), enabling us to uncover potential developmental strengths and vulnerabilities in the pre-school years.

In assessing positive adjustment, one has to take into account that it is possible for a child to be competent in one domain but not another, and that mastery of developments in a particular domain cannot be assumed to generalize to other domains. For example, it is possible that a child growing up in poverty shows good academic performance but at the same time develops behaviour adjustment problems (Luthar, 1991). Thus, unless multiple domains of adjustment are assessed, only a partial picture of adaptation can be formulated (Cicchetti & Garmezy, 1993; Masten, 2009, 2011). In this study we take into account adjustment across domains, assessing cognitive, social, emotional as well as behavioural adjustment of children exposed to childhood poverty and family instability.

The manifestation of resilience is not a personality characteristic, as the process of withstanding the negative effects of adversity is associated with multiple factors, including features of the child, their parents, and the wider social context (Luthar, 1999; Masten, 2001; Rutter, 2006; Schoon, 2006). In addition to individual characteristics, such as biological factors (e.g. birth weight or early motor development) or indicators of early temperament that may foster positive adjustment, features in individuals' social context may also support against adversity. Family interactions, neighbourhood characteristics and child-care arrangements have all been shown to mediate the effect of family hardship on child development (Collishaw, et al., 2007; Luthar, 1999; Masten, 2007; Rutter, 2006). Acknowledging the dynamics and evidence regarding multiple sources of influence, a systems-oriented definition of resilience was adopted, defining resilience as the capacity of a dynamic system to withstand or recover from assaults on the developmental process (Masten, 2011; Schoon, 2006, 2012).

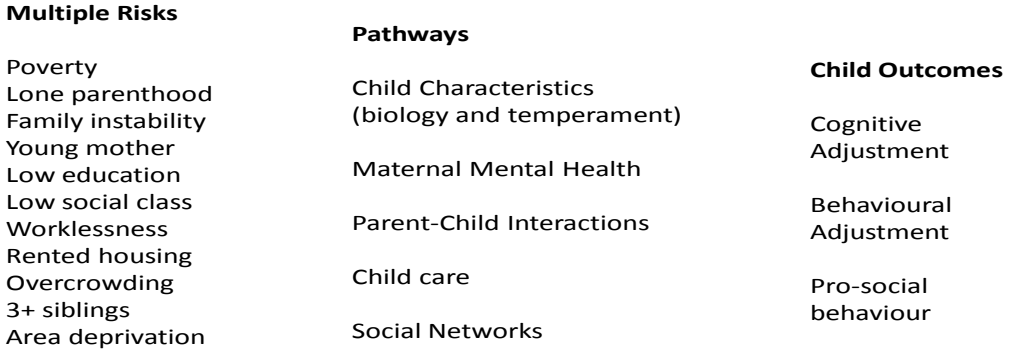
In addition, evidence suggests that hardship has differential effects on specific child outcomes, with poverty generally exhibiting stronger associations with cognitive development (Conger, Conger, & Martin, 2010; Kiernan & Mensah, 2008; Schoon, Hope, et al., 2010) , and family disruption being more salient for emotional/behavioural adjustment. As a result, we need to know more about the configurations of associations among indicators that are most salient for different outcomes, and about variations in children's susceptibility to environmental influence (Pluess & Belsky, 2010). Our lack of understanding of *how* the experience of hardship and family instability influences child development across domains has greatly hampered the ability of policy makers to design effective interventions to improve child wellbeing. These are the issues this study is designed to address.

1.6. A dynamic systems view of resilience

Our approach is based on a developmental-contextual systems model of resilience, which is informed by an ecological life course perspective that sees human development as a dynamic process, emphasising multiple and interacting levels of influence (Bronfenbrenner, 1979, 1989), human plasticity (Lerner, 1996), developmental co-regulation (Sameroff, 1983; 2010) and the role of the wider socio-historical context in which development takes place (Elder, 1998). This perspective acknowledges the age-dependent sequencing of emerging capacities and competences, as well as the timing and duration of risk exposure, enabling us to identify potentially sensitive periods for interventions during the early years (Schoon, 2006). Influences on child development are multiple, and can be reciprocal, bidirectional, and cumulative, exacerbating or ameliorating the effects of family adversity on developmental outcomes.

We aim to elucidate diverse groups of mechanisms that might contribute to the association between adversity and child adjustment. Gaining a better understanding of the mediating processes can inform the design and implementation of policies aiming to improve children's wellbeing. Figure 1 gives an overview of the multiple socio-demographic risk factors considered in our analysis, the different child outcomes under consideration, and the potential mediating pathways linking adversity to child outcomes.

Figure 1: Pathways linking multiple disadvantage to child outcomes



Our outcome comprises different indicators of child wellbeing (broadly defined as adjustment at or above the cohort median in specific domains as well as regarding adjustment across domains). Although the promotion of wellbeing has been criticized for diverting policy focus away from the need to overcome child poverty, these are not in any sense mutually exclusive aims; as operationalized here, the concept is broad enough to incorporate a focus on both individual and societal wellbeing (Sen, 1993).

2 Sample and Data

2.1 Sample

The study draws on data collected for the UK Millennium Cohort Study (MCS), following the early development of over 18,000 babies born in the UK between September 2000 and January 2002 (Dex & Joshi, 2005). MCS data are available to researchers through the UK Data Archive. Data have been collected at ages 9 months (wave1), 3 years (wave2), 5 years (wave3), 7 years (wave4) and 11 years (wave5). Information was obtained from parents (fathers as well as mothers) via personal interview and self-completion questionnaire, covering information on the child's health and development; family structure and demographics; parental education, employment, health and psychological well-being; and parenting styles and family relationships. In addition, individual cognitive testing of the children took place from wave 2 onwards.

18,553 families (of 18,819 babies) provided data at 9 months. The second wave (at child age 3 years) included 15,590 families (14,898 studied in the first survey, along with 692 who had been eligible for inclusion but not interviewed at Wave 1). Response at Wave 3 was similar, with 15,246 families (79.2% of the cohort) being interviewed when the child reached age 5 (Hansen & Joshi, 2008). Here we focus on preschool children, using assessments made at ages 9 months, 3 and 5 years (waves 1-3). For 12,395 cases we have complete data regarding poverty and family status at waves 1-3. For 11,277 children we have complete data regarding family poverty and family status at age 9 months, 3 and 5 years and cognitive and behavioural outcomes at age 5. Our analytic sample comprises 8,832 children with complete data regarding family poverty and family status at age 9 months, 3 and 5 years, all control variables, and cognitive and behavioural outcomes at age 5.

2.2 Variables

Child wellbeing. Indicators of child wellbeing include cognitive, socio-emotional and behavioural adjustment at age 5 years. Children's cognitive development was assessed directly at age 5 years. Each study child was individually assessed using the British Ability Scales (BAS, Elliott, 1983), a reliable measure of cognitive functioning with good external validity (Elliott, 1996; Hill, 2005). Information on the children's behavioural, social, and emotional adjustment was collected using maternal reports on the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997), a well-validated instrument. More details of the assessments are given in section 3.2.1. and 3.22.

Family poverty. We identified families living in poverty on the basis of whether their household income fell below the poverty line (60% of the equivalised median net household income) at each of the observations points. A dummy variable was created to identify families in poverty at age 9 months, 3 and 5 years (see Table 1). We then created a variable

that indicated how many times the family was in poverty, ranging from 0 to 3. We use the term 'persistent poverty' to refer to poverty status at each survey point. We note, however, that it cannot be assumed that the families that we identified as persistently poor were indeed poor throughout the whole period under consideration as the families were not observed continuously and there might have been some fluctuation in family and household circumstances. The discussion of persistent poverty is therefore subject to this caveat.

Family structure and transitions. At each wave, mothers reported whether they were involved in a relationship, and if so, whether they were living with a partner, married, and whether (at Waves 2 and 3) the current partner was the same as the partner identified in the previous wave. At age 5 years about 75% of children were living in a stable two-parent family (58% stably married, 13% stably cohabiting families, and 6% of initially cohabiting parents who later married) and 7% grew up in a stably single parent household. About 12% experienced a relationship break-up. These groupings (and the more complex longitudinal patterns that underlie them) are large enough for subgroup analysis. Here we report both relationship status at individual waves and change in relationship status over time. Change was computed by comparing status at a given wave to status at the previous wave; if the status was not the same, a change was considered to have occurred between the two waves.

Child characteristics. Indicators of early child characteristics in the first year of life include the attainment of gross and fine motor developmental milestones (Frankenburg & Dodds, 1967), early child temperament (Carey & McDevitt, 1978; Carey & McDevitt, 1995), and whether the child's crying was seen as a problem, all assessed via maternal report at 9 months.

Maternal mental health. The MCS includes measures of maternal depression at the first three waves, based on the Malaise Inventory (Rutter et al, 1970) when the child was 9 months old and the 6-item Kessler psychological distress scale (Kessler et al., 2002) when the child was aged 3 and 5 years. For our analysis we reversed the scoring of each scale so that a high score indicates low levels of depression and distress, i.e. relative mental health.

Parents and parenting. The role of parent-child interactions as important mediators shaping the association between material hardship and child development has been established in past studies. Here we use a variety of indicators of parent-child interactions:

- *Breastfeeding* was identified from a question asking mothers whether the child had ever been breastfed for more than one day (yes or no).
- *Quality of the parent-child relationship* was assessed at age 3 years using the Pianta scale (Pianta, 1992), a 15 item self-administered rating scale with responses on a 5-point Likert scale. A total score was derived, with a high score reflecting an overall positive relationship.
- *Cognitive stimulation* at age 3 years was measured on the basis of maternal report on whether the child was read to at least once a week, and whether the parents took the child to the library.

- *Regularity of routines*: two items assessing whether the child had regular bed and meal times
- *Parental discipline* was measured using seven items from the Murray Strauss's Conflict Tactics Scale (Straus & Hamby, 1997). A high score indicates a more gentle parenting style.

Childcare. MCS provides information about formal and informal childcare arrangements at age 9 months and 3 years. Informal (or non-group) care includes care provided by the partner, grandparent or other relative, nannies and au pairs; formal group care includes childminder, day nursery, nursery school, playgroup, pre-school, or after-school club.

Social support and neighbourhood characteristics

The degree of *social support* was assessed on the basis of information (maternal report) on whether family and friends live in the neighbourhood. Characteristics of neighbourhood were assessed with two questions on a 5-point Likert scale, asking parents if their neighbourhood is safe and a good area for raising kids.

Index of Multiple Risks (IMR)

To take into account the existence of multiple potential risk factors that have been linked to children's adjustment, we constructed an index of multiple risks, combining the following variables which have been dichotomised:

- persistent poverty (poverty at all three waves of observation)
- single parenthood (single parent at birth of child: yes/no)
- multiple family transitions (2+ family transitions involving gaining or losing a partner between waves 1 and 3: yes/no))
- young motherhood (teenage mother: yes/no)
- lack of maternal educational qualifications (no qualifications: yes/no)
- low occupational social class (parents have a routine or unskilled occupation: yes/no)
- parental worklessness (no parent in the household is working: yes/no)
- lack of home ownership (rented housing: yes/no)
- home overcrowding (more than 1 person per room: yes/no)
- large number of siblings (4+ siblings: yes/no)

- area deprivation (bottom quintile of the index of multiple deprivation (IMD)[1]).

Each individual item was dichotomised so that a 0 indicates absence of the risk factor and 1 indicates its presence, and the number of risk factors present was then summed. A more detailed description is given in section 3.4 of the report.

Control variables

In the analyses predicting children's cognitive and behavioural adjustment we took into account early individual difference factors and controlled for characteristics of the child (age, gender and ethnicity).

2.3 Analyses

Many of the results reported here are basic tabulations of the number and percentage of families who fall into certain categories or have certain experiences. In the section on protective factors, we use some OLS regression; more details on these analyses are provided in that section. All analyses are run in STATA version 12, using adjustments for the survey sampling design and attrition from the study.

[1] Area deprivation was measured with the Index of multiple deprivation (IMD) which gives a measure of relative levels of deprivation in small areas across indicators of income and employment, health, education, crime, access to services and living environment in an area. We take the bottom quintile to identify families living in the most deprived areas.

3 Results

In this section we document the family socio-economic circumstances of children in the MCS cohort during the first three waves of data collection, i.e. at ages 9 months, 3 and 5 years, along with family structure and family changes during the same period. First, we report on the extent of poverty among families with preschool children. Second, we examine the bivariate association between poverty and children's outcomes. Third, we examine associations between poverty, family instability and other potential risk factors as well as their combined impact on children's wellbeing across domains. Lastly, we assess the role of potential protective factors in reducing the association between multiple risk factors and the child outcomes. A multi-step analysis gives us a better understanding of potential mediating and moderating processes shaping the association between poverty and child adjustment.

3.1 Family Poverty

Table 1 shows the poverty status of the families. The number of times a family could be in poverty across waves 1 through 3 ranges from zero to 3. Columns two and three show the numbers and percentages for all of the 12,395 families for whom we have valid poverty data at all three waves. Columns four and five show the numbers and percentages for our analytic subsample—the reduced sample (n=8,832) for whom we have valid poverty, family instability, and child outcome data for all three waves. Of all valid cases, 58.5 per cent were not in poverty at any of the waves while 16 per cent were poor at all three waves (persisting poverty). The rates of poverty in our analytic subsample are lower (65% never poor and 11% poor at 3 time points), suggesting that the analytic sample contains fewer families who have experienced poverty, in particular persisting poverty. The findings therefore have to be interpreted with this caveat in mind – if anything they will underestimate the effect of poverty on children's outcomes.

Table 1. Equivalised net household income < 60% national median at 9mths, 3 and 5 years

	All valid cases		Analytic Subsample	
	N	**%**	**N**	**%**
Never poor	6,757	58.5	5,534	65.3
Once	1,828	14.4	1,300	14.3
Twice	1,498	11.0	891	9.4
Poor at all three time points	2,312	16.1	1,107	11.0
Total	12,395	100.0	8832	100.0

Table 2 shows a more detailed breakdown of poverty status over the first three waves. The three letter codes indicate poverty status at the three waves, where 'n' indicates not in poverty and 'p' indicates in poverty. Thus, a family with the code 'npn' was not in poverty at wave one, was in poverty at wave two, and was not in poverty at wave three. Our coding thus enables us to differentiate between families who were never poor, those who moved in and out of poverty at different ages of the child, and those who were persistently poor. As already mentioned above, compared to the full sample, the rates of poverty are slightly lower in our analytic sample, suggesting that those in poverty, especially persistent poverty are less likely to be represented in our analyses

Table 2. Descriptive Statistics: Poverty status across waves

Poverty Status Across Sweeps	All valid cases		Analytic Subsample	
	N	**%**	**N**	**%**
nnn	6,757	58.5	5,534	65.3
nnp	612	4.9	430	4.7
npn	543	4.4	394	4.3
npp	526	4.0	306	3.4
pnn	673	5.2	476	5.2
pnp	417	3.0	258	2.7
ppn	555	4.0	327	3.3
ppp	2,312	16.1	1,107	11.0
Total	12,395	100.0	8,832	100.0

The data suggest that the majority of families had never experienced poverty, about one in ten experienced poverty at three time points and about a third moved in and out of poverty.

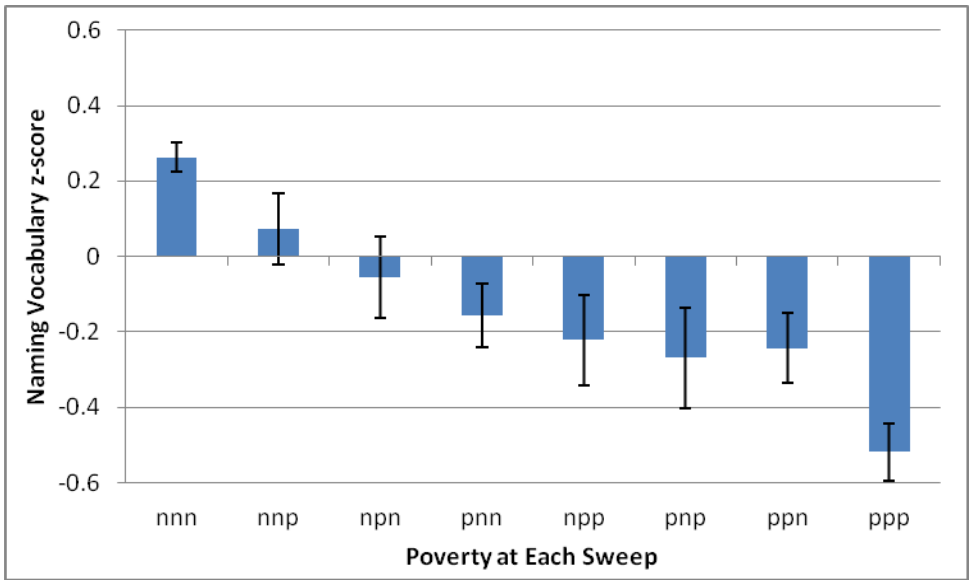
3.2 Association between poverty and child outcomes

In a next step we considered the (direct or bivariate) relationship between family poverty and each outcome, unadjusted for any other factors. Figures 1-9 show the association between poverty status across waves and the outcomes for children at age 5. First we focus on cognitive outcomes and then behavioural adjustment (including social and emotional outcomes).

3.2.1. Cognitive outcomes

Cognitive abilities were directly assessed at age 5 by specially trained interviewers using three subscales from the *British Ability Scales Second Edition (BAS II*). In particular, assessments were made on naming vocabulary, picture similarities, and pattern construction, capturing core aspects of verbal, pictorial reasoning, and spatial abilities (Elliott, 1996; Hill, 2005). Age-related starting points, decision points, and alternative stopping points were used to ensure that the motivation and self-esteem of the child were protected, that the testing focuses on the most suitable items for the child, and that the assessment time was kept to a minimum. The test scores were z-standardised to facilitate comparison of effects. High scores indicate good cognitive ability.

Figure 2. Child Age 5 BAS Naming Vocabulary Score by Family Poverty Across Waves



Note: The three letter codes indicate poverty status at the three waves, where 'n' indicates not in poverty and 'p' indicates in poverty. Thus, a family with the code 'npn' was not in poverty at wave one, was in poverty at wave two, and was not in poverty at wave three.

As shown in Figure 2, children who never experienced poverty scored higher on the naming vocabulary subscale than did children who experienced poverty at all three time points. This graph also shows that more waves in poverty, and the experience of poverty at age 9 months (pnn) are associated with lower scores. That is, the timing and the persistence of poverty matter for children's cognitive development. It is also interesting to note that

experiencing poverty only once is already associated with a lower level in attainment. A very similar pattern can be seen for Picture Similarities and Pattern Construction (Figures 3 and 4), although the effect of poverty on these two scales is less marked than for naming vocabulary. The findings thus suggest that poverty has the strongest association with the development of verbal skills.

Figure 3. Child Age 5 BAS Picture Similarities Score by Family Poverty Across Waves

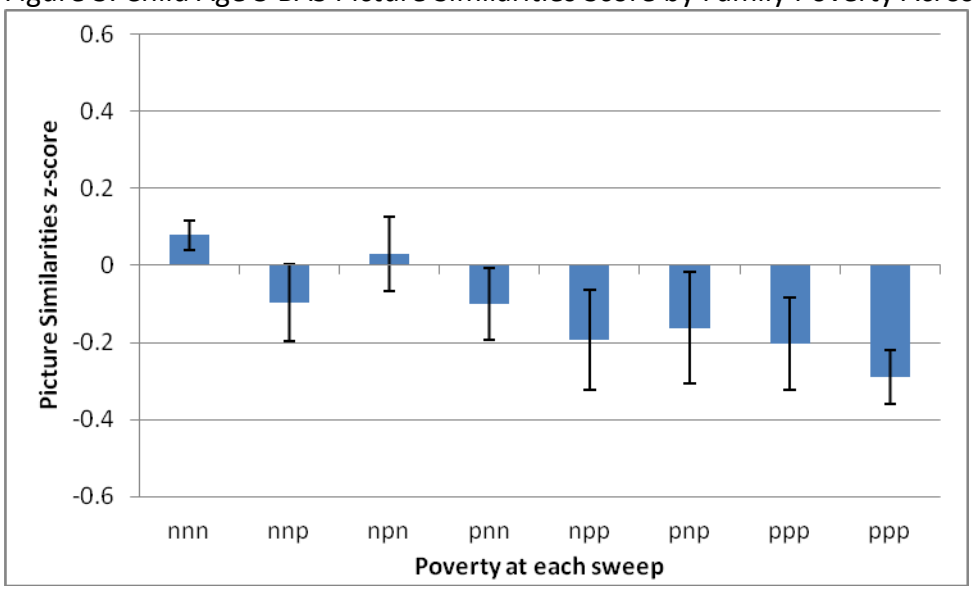
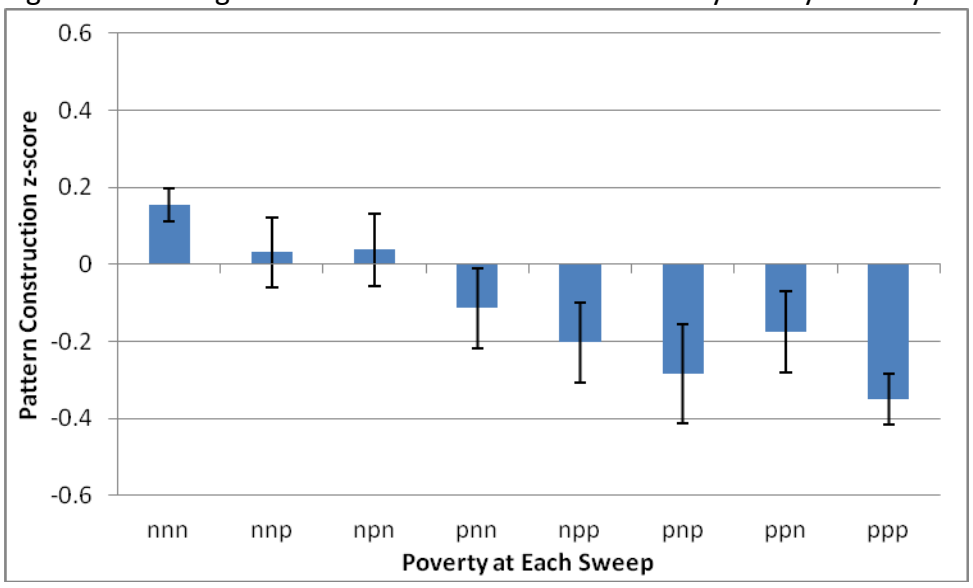


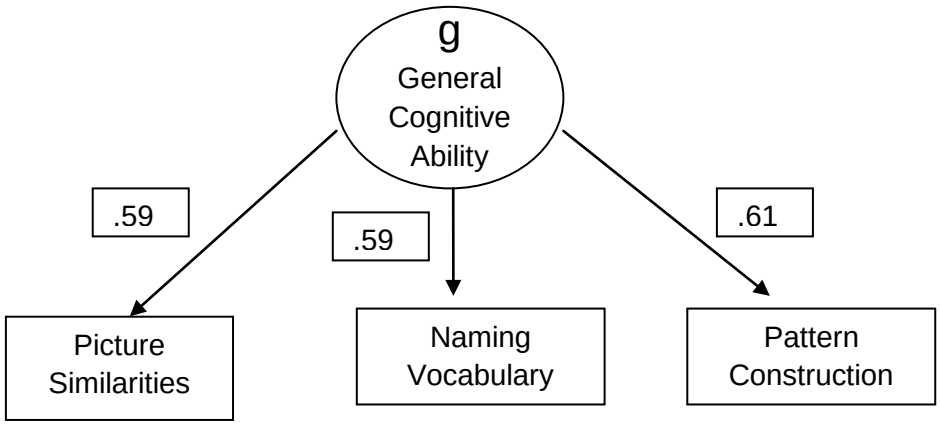
Figure 4. Child Age 5 BAS Pattern Construction Score by Family Poverty Across Waves



In a next step we combined the 3 subscales of the BAS into one overall score indicating general cognitive ability at age 5 years. The overall score was created using Principal Component Analysis (PCA). The analysis confirmed the presence of a general cognitive ability factor, traditionally dubbed *g* (Carroll, 2006). Examination of the scree slope suggested the presence of a single component. The first unrotated factor accounted for 56% of the total variance among the three tests. The loading of each of the tests on the first

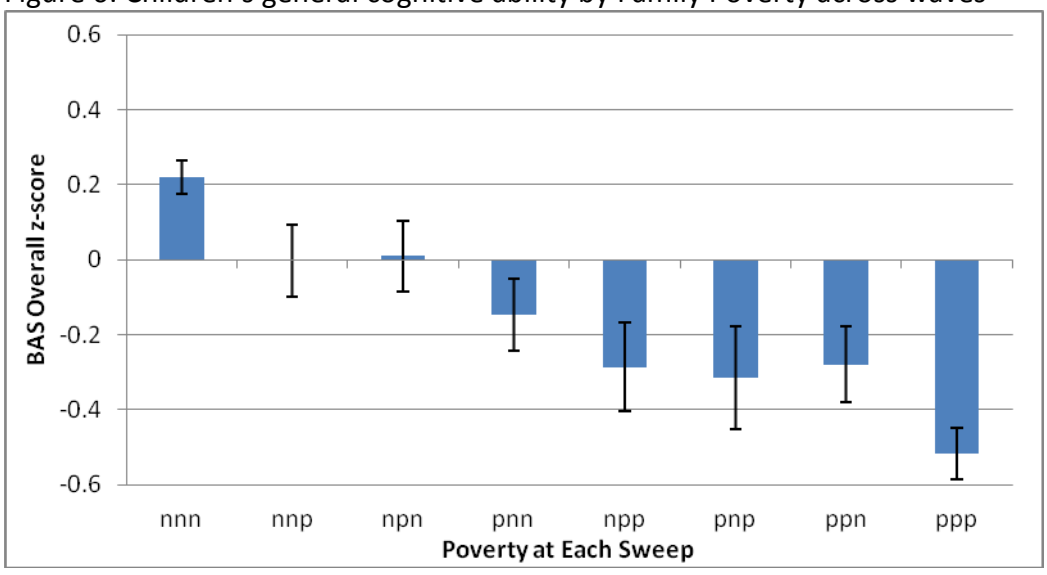
unrotated factor was .59 for picture similarities, .59 for naming vocabulary, and .61 for pattern construction.

Figure 5: General Cognitive Ability: Factor loadings



We saved *g* scores for each participant, based on the first unrotated factor from the PCA. The scores indicating general cognitive ability (g) were were z-standardised to a mean of 0 and a standard deviation of 1. A high score indicates high cognitive ability. Figure 6 shows the associations between the general cognitive ability score and the experience of poverty. The more waves in poverty, and the experience of poverty at age 9 months are associated with lower cognitive test scores. Our findings thus suggest that regarding the development of general cognitive ability the timing and the persistence of poverty matters. Furthermore, experiencing poverty only once is already associated with lower levels of ability at age 5.

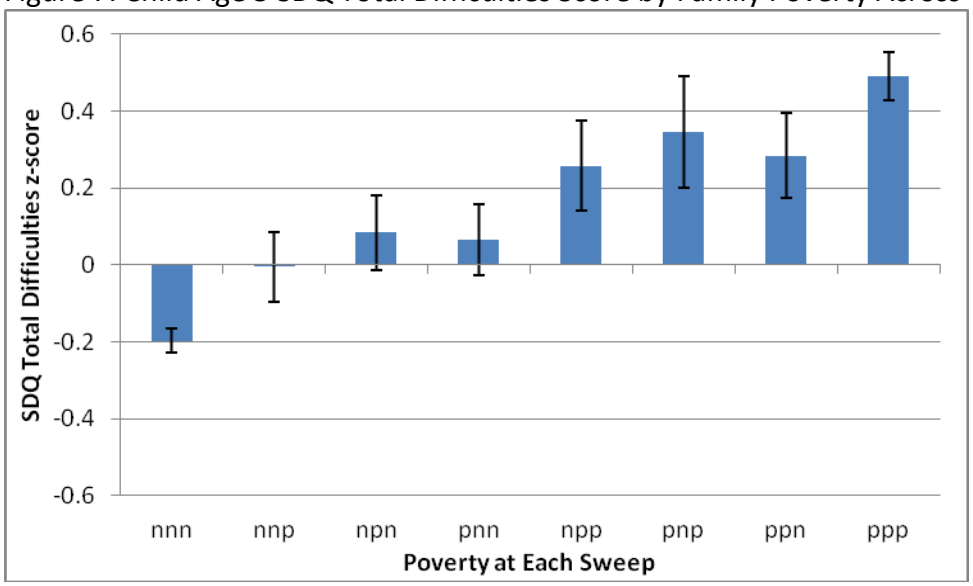
Figure 6: Children's general cognitive ability by Family Poverty across waves



3.2.2. Behavioural Adjustment

Behavioural adjustment of the children at age 5 years was measured with the Strength and Difficulties Questionnaire (SDQ). The SDQ was assessed via parental report (normally from the mother) in the computer-assisted self-completion module. The SDQ is a well-validated tool for screening behavioural problems and potential psychiatric disorder (Goodman, 1997, 2001; Goodman, Meltzer, & Bailey, 1998). It consists of 25 items generating scores for five subscales measuring conduct problems, hyperactivity, emotional symptoms, peer problems and pro-social behaviour. It thus enables us to assess behavioural problems as well as social and emotional adjustment of young children. Each subscale comprises five items. Each SDQ item has three possible answers which are assigned a value 0, 1, or 2. The score for each scale is generated by adding up the scores on the five items within that scale, producing scale scores ranging from 0 to 10. We also calculated an overall difficulties mean score for the whole sample, summing replies to the four subscales indicating problematic behaviour, i.e. conduct problems, hyperactivity, emotional symptoms, and peer problems. All outcomes are reported as z-scores. A high score indicates a high level of behaviour problems.

Figure 7. Child Age 5 SDQ Total Difficulties Score by Family Poverty Across Waves



Note: The three letter codes indicate poverty status at the three waves, where 'n' indicates not in poverty and 'p' indicates in poverty. Thus, a family with the code 'npn' was not in poverty at wave one, was in poverty at wave two, and was not in poverty at wave three.

Figure 7 shows the results for the SDQ Total Difficulties score and its association with exposure to family poverty. Children growing up in families without exposure to poverty at any of the three waves have fewer behaviour problems than children who experienced poverty at multiple waves. Experiencing poverty only once is already associated with a higher level of behaviour problems. The highest levels of behaviour problems are associated with repeated experience of poverty.

We now look at z-scores for each of the different subscales (Figures 8 – 12). The findings suggest that poverty, in particular persistent poverty, is most markedly associated with conduct problems (Figure 8) and peer problems (Figure 11).

Figure 8. Child Age 5 SDQ Conduct Problems Score by Family Poverty Across Waves

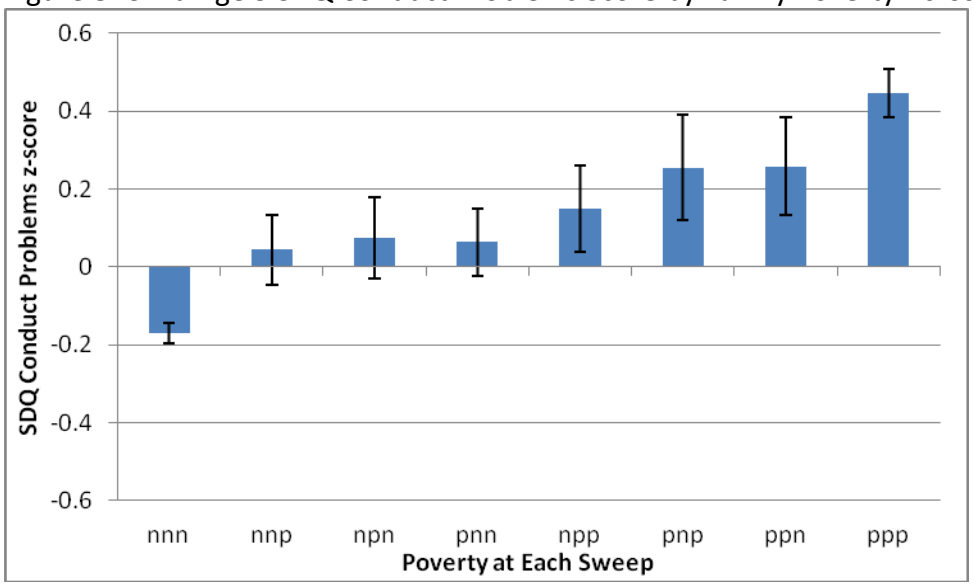


Figure 9. Child Age 5 SDQ Hyperactivity Score by Family Poverty Across Waves

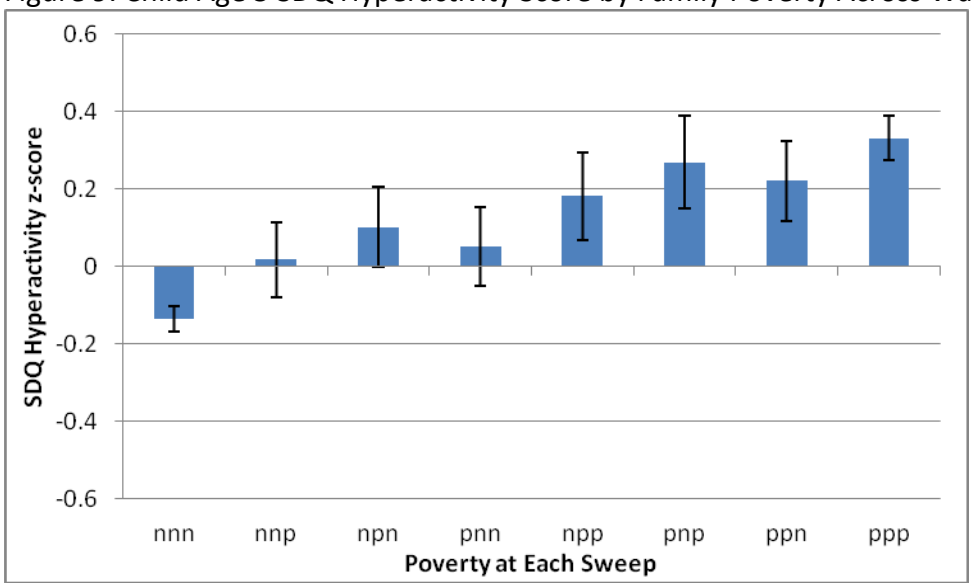


Figure 10. Child Age 5 SDQ Emotional Symptoms Score by Family Poverty Across Waves

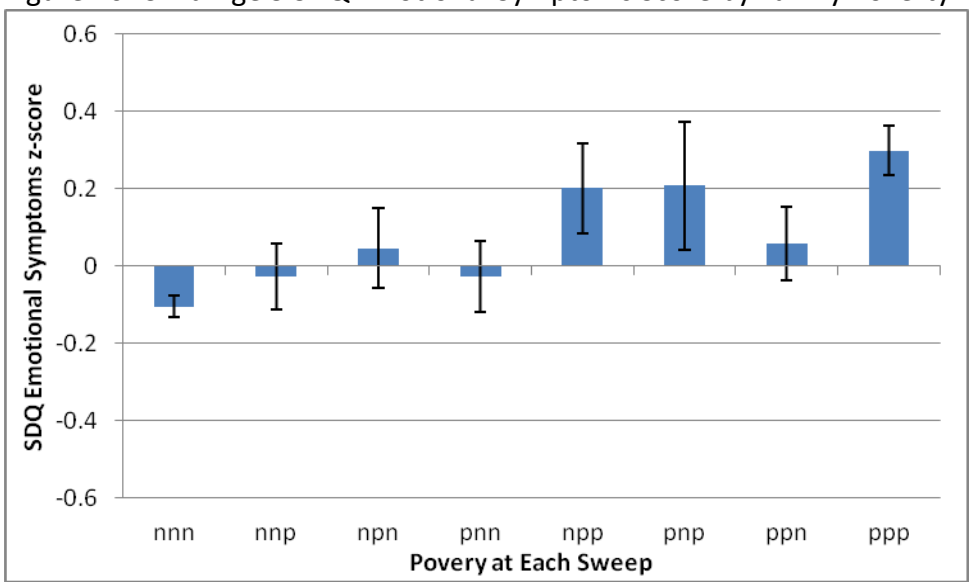
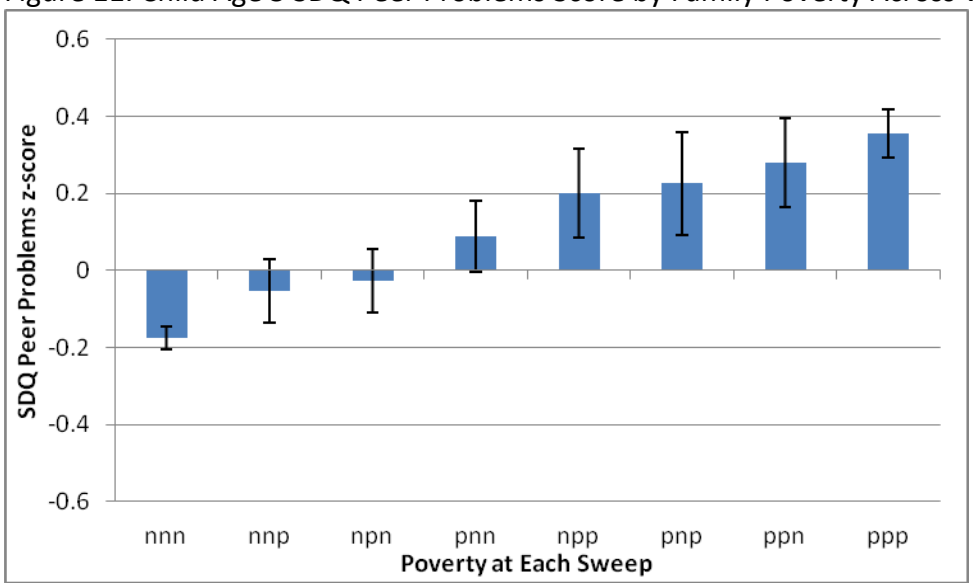
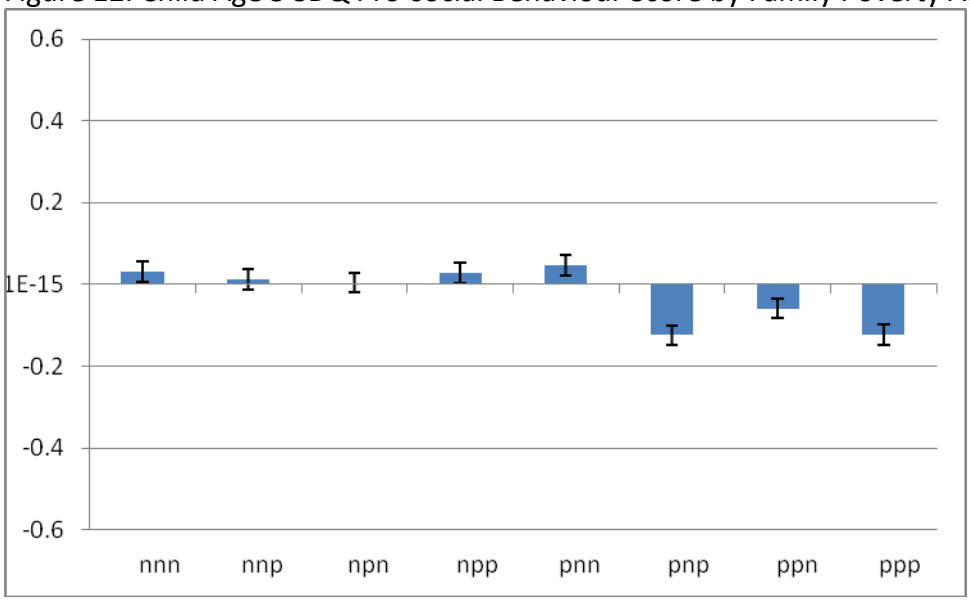


Figure 11. Child Age 5 SDQ Peer Problems Score by Family Poverty Across Waves



We also looked at the 5th subscale of the SDQ indicating positive behaviour, i.e. prosocial behaviour. Prosocial behaviour is one of the most important aspects of humans, distinguishing us from other species, indicating the degree of helping and cooperation with others (Fehr & Fischbacher, 2003). Prosocial children are generally relatively well-adjusted and have better peer relationships than children low in prosocial behavior (e.g., Clark & Ladd, 2000). Figure 12 suggests that prosocial behaviour is least affected by the experience of poverty, although repeated experience of poverty is associated with slightly lower levels of prosocial behaviour.

Figure 12. Child Age 5 SDQ Pro-social Behaviour Score by Family Poverty Across Waves



3.3. Family stability and instability and its association with poverty

This section describes the levels of family stability and instability experienced by children during the first three waves of the MCS. To begin, Table 3 shows the marital status of the main respondents (predominantly mothers) at each wave. Over 60 per cent of respondents were married at each wave, about a fifth were cohabiting, and about a sixth were single parents. Compared to the complete sample the analytic sample appears to include slightly more married parents, and slightly fewer single parents; in general, however, the analytic sample appears to be more or less representative of the complete sample.

Table 3. Marital Status of Main Respondents at Each Wave

	All available cases (N=12,395)			**Analytic subsample (N=8,832)**		
	9 mos (MCS 1)	**3 yrs (MCS 2)**	**5 yrs (MCS 3)**	**9 mos (MCS 1)**	**3 yrs (MCS 2)**	**5 yrs (MCS 3)**
Married	62.0	65.9	63.4	63.5	67.7	65.0
Cohabiting	24.4	17.8	18.7	24.6	18.0	18.6
Lone	13.6	16.2	17.9	11.9	14.4	16.3

Although most young children experienced stable family situations, there was also considerable movement in family status between waves. Table 4 shows the transitions made by families over the first three waves, broken down by status at the first wave ("baseline"). The largest category (and the majority of families) comprised parents who were married at all three waves, with those cohabiting at all three waves as the next largest group, followed by those who were single at all three waves. Most families (about 75 per cent of the sample) can be characterized as stable two parent families over the three waves. Around 1 in ten families were stable single parent families. About 12 per cent of families experienced a relationship breakup while around 7 per cent experienced formation or formalization of a relationship. Table 4 furthermore shows that our analytic sample is more or less representative of the overall sample in terms of family stability and change.

Table 4. Family Transitions Over the First Three Waves

Family transitions	**All available cases**		**Analytic subsample**	
Married at Baseline	**n**	%	**n**	%
Stably Married	7,035	56.1	5,108	57.8
Exit marriage	708	6.0	480	5.7
Cohabiting at Baseline				
Stably Cohabiting	1,470	12.4	1,108	12.9
Cohabitation to marriage	640	5.5	482	5.7
Cohabitation to other	731	6.5	504	6.0
Single at Baseline				
Stably Single	1062	8.1	678	7.1
Single to married	187	1.3	103	1.1
Single to other	562	4.2	369	3.7
All	12,395	100.0	8,832	100.0

Note: Multiple transitions are included in the 'to other' categories. Unlike the coding of the poverty variable, the exact timing of family changes is not accounted for in the categorisation (so that, for example, parental separation includes separations occurring at any time point after wave 1).

The coding of family transitions captures the major groupings. There were also a small number of families who experienced multiple transitions, such as cohabitation at wave 1, being a lone parent at wave 2, and being married or cohabiting at wave 3. These multiple transitions are captured in the 'other' coding. Among initially married families we found less than 1% of mothers who underwent multiple transitions and we grouped them as 'exit marriage'.

The experience of repeated poverty and family instability are closely linked, as can be seen in Table 5.

Table 5: Family Transitions by Number of Waves being Poor (analytic subsample, n=8,832)

	Times Poor (row %)			
Family transitions	**None**	**One**	**Two**	**Three**
Married at Baseline				
Stably Married	81.1	11.0	4.58	3.36
Exit marriage	48.2	25.5	14.7	11.6
Cohabiting at Baseline				
Stably Cohabiting	59.0	18.8	11.8	10.4
Cohabitation to marriage	72.7	17.3	5.4	4.7
Cohabitation to other	27.8	19.8	21.5	30.9
Single at Baseline				
Stably Single	9.6	10.5	23.5	56.4
Single to married	20.1	27.9	36.3	15.7
Single to other	14.2	20.4	27.0	38.3
All	65.3	14.3	9.4	11.0

Families never experiencing poverty at any of the waves are most likely to be stably married or cohabiting, or are cohabiting couples who have formalized their relationship. Those who experience poverty once or twice are likely to have experienced a relationship break-up or multiple transitions (the 'other' category includes multiple transitions). Those families who experience poverty at all three time points are most likely to be single parents (either stably single or single parents with multiple transitions).

To get a better picture of the dynamics of the family environment we used a different coding for the subsequent analysis – differentiating between initial marital status (married and cohabiting versus single) and subsequent transition experiences, counting the number of transitions between waves. Table 6 shows that in the analytic sample about one in ten were single parent families at birth and 5% of families experienced 2+ transitions.

3.4. Exposure to multiple socio-demographic risk factors

In addition to family structure and family instability, the experience of poverty is furthermore linked to other indicators of family demographics and deprivation reflecting the cumulative risks experienced by disadvantaged families. These additional factors include parental education and employment status, maternal age, housing conditions and area deprivation. Table 6 shows the association between poverty and these other risk factors. The risk factors were all coded as dichotomous variables, indicating respectively single parenthood at birth, multiple family transitions (2+), young motherhood (<20 years at first birth), lack of educational qualifications, low occupational social class (semi/routine occupations), parental worklessness (no parent working), lack of home ownership, home overcrowding (more than 1 person per room), large number of siblings (3+), and area deprivation (top quintile of the Index of multiple deprivation (IMD)).

Table 6: Poverty and multiple other risk factors (row %)

	Number of Sweeps Poor				Overall
	None	One	Two	Three	
Single parent at birth (W1)	2.3	13.8	31.3	46.3	13.5
2+ family transitions (W1-3)	2.5	7.0	9.1	7.9	4.7
Young mother (W1)	0.5	5.5	10.2	14.3	4.3
Parents no education (W1)	0.7	4.1	11.1	26.8	6.1
Low social class (W1)	7.1	25.0	39.6	47.7	19.1
Workless household (W1)	3.5	12.2	23.7	60.6	12.2
No housing tenure (W1)	25.8	20.0	21.7	32.5	30.1
Overcrowding (W1)	2.9	8.8	13.7	20.9	7.5
3+ sibs (W1)	1.3	2.1	4.8	10.1	3.1
Area deprivation (W1)	8.4	22.8	37.4	53.2	20.1
N	5534	1300	891	1107	8832

Repeated poverty appears to be associated with most strongly with parental worklessness, area deprivation, low social class (routine level occupations), and single parenthood.

Which of these factors are independently associated with repeated exposure to poverty? We run a multinominal logistic regression model to assess the independent effect of each of the risk factors over and above the other risks (which were all included in the model) in predicting the experience of repeated poverty.

Table 7: Predicting repeated exposure to poverty: Multinominal logistic regression analysis (relative risk ratios)

	Experience of Poverty (reference group: never)					
Risk Factors	**Once**		**Twice**		**3 times**	
	RRR	SE	RRR	SE	RRR	SE
Family structure at W1: Married/cohabit (ref)						
Single	1.73#	.31	2.53*	.60	1.61$	.37
Number of family transitions W 1-3 : None or one (ref)						
2+	2.20*	.38	2.33*	.58	2.14#	.60
Mother's age at W1: 20+ (ref)						
Teen parent	3.14*	.84	3.66*	.99	4.52*	1.17
Parental education W1: GCSE or higher (ref)						
None/Some	2.54#	.86	3.82*	1.42	6.21*	2.30
Parental social class W1: Higher (ref)						
Semi-routine and routine	2.42*	.26	3.61*	.47	4.68*	.60
Family employment status W1: At least one parent working (ref)						
No one working	5.99*	1.45	12.21*	2.84	53.90*	12.87
Housing Tenure W1: Own home (ref)						
Don't own home	3.01*	.28	5.79*	.77	10.94*	1.77
Crowding at W1						
More than one room/person	1.35$	.24	2.04*	.44	1.74#	.41
No of siblings at W1: Two or fewer siblings (ref)						
3+ siblings	1.76#	.33	3.10*	.69	5.89*	1.49
Ward Deprivation (IMD) W1 : Not in high IMD ward (ref)						
In high IMD ward (bottom quintile)	1.97*	.22	2.95*	.40	4.06*	.65

Table Notes: * p<0.001; # p<0.01; $ p<0.05

All of the risk factors show independent associations with repeated exposure to poverty. The relative risk ratios are commonly interpreted as odds ratios: for a unit change in the predictor variable, the relative risk ratio of outcome relative to the referent group is expected to change by a factor of the respective parameter estimate given the variables in the model are held constant. For example, compared to married families, single parent families are 61 per cent more likely to experience persistent poverty. The findings suggest

that persistent poverty is most strongly associated with parental worklessness, followed by home ownership, parental education and number of siblings.

Given the significant association between poverty and area deprivation, we also examined regional variations in poverty exposure (see Appendix A). The findings suggest that there is variation in risk exposure by region, with those living in the east and south tending to have lower rates of exposure to these risks. Persistent poverty and single parenthood are especially prevalent in the North of England, Wales, and Northern Ireland. Highest rates of overcrowding are found in London and Scotland. Large families are most prevalent in Northern Ireland, and area deprivation is most pronounced in the North of England.

3.4.1. Do family structure transitions during a child's first five years account for the association between poverty and children's wellbeing?

To test this assumption we ran stepwise multiple regression models to predict general cognitive ability (using the g score of general cognitive ability derived from the three BAS subscales) and behavioural adjustment (using the overall SDQ problem score). Figure 13 gives a diagrammatic depiction of the model that we tested.

Figure 13: Pathways linking multiple disadvantage to child outcomes

First we report the findings for cognitive adjustment. In Model 1 we test the direct association between poverty exposure and children's cognitive ability. In Model 2 we test the direct association between family structure at birth and family instability between waves 1-3 and children's cognitive ability. In Model 3 we assess the association between poverty exposure and cognitive ability, also taking into account the role of family structure at the birth of the child and subsequent family transitions. In Model 4 we add the other potential risk factors that have been associated with both poverty and family instability. Adding these factors to the model we can make sure that our findings are not spurious, i.e. that they cannot be explained by pre-existing family demographics (parental education, maternal age, family employment status) and other experiences of deprivation, such as

housing conditions and area deprivation. All models are controlled for characteristics of the child (age, gender, ethnicity) to account for early individual difference factors.

Table 8: Predicting children's general cognitive ability by poverty, family instability and family demographics, controlling for child characteristics (child age, sex, and ethnicity)

	Model 1		Model 2		Model 3		Model 4	
Poverty exposure (Ref: none)	B	SE	B	SE	B	SE	B	SE
Once	-.21*	.03			-.18*	.03	-.14*	.03
Twice	-.49*	.04			-.41*	.04	-.24*	.05
Three times	-.58*	.04			-.50*	.04	-.27*	.05
Family status at birth (Ref: married)								
Single			-.20*	.03	-.12*	.03	-.07$	.03
Cohabit			-.48*	.03	-.10$	.04	-.01	.04
Family transitions (Ref: none)								
1			-.05	.03	.01	.03	.02	.03
2+			-.17*	.05	-.09	.05	-.04	.05
Other risks								
Young mother (W1)							-.14$	.05
Parents no education (W1)							-.26*	.05
Low social class (W1)							-.14*	.03
Workless household (W1)							-.10$	.04
No housing tenure (W1)							-.12*	.03
Overcrowding (W1)							-.15#	.05
3+ sibs (W1)							-.19$	.07
Area deprivation (W1)							-.10$	.04
R^2	.12		.09		.12		.14	

Table Notes: * p<0.000; # p<0.001; $ p<0.005

The findings suggest that repeated and persistent poverty has a significant association with general cognitive ability at age 5 (Model 1), as have variations in family structure and instability (Model 2). The association between poverty and general cognitive ability is slightly stronger than that between family structure and instability and general cognitive ability, explaining 12% of the variation in the outcome versus 9%. The association between poverty and general cognitive ability cannot fully be explained through indicators of family structure and instability (Model 3), although there is a significant association between family structure at birth (in particular single parenthood) and children's cognitive development. The association between poverty and cognitive development can furthermore be partly explained by the additional risk factors included in Model 4 (as indicated through the considerable reduction in the Beta coefficient). Model 4 furthermore suggests independent risk effects of the other risks factors. They are significantly associated with

general cognitive ability over and above the risks associated with poverty, family structure and family instability – especially parental education, social class and home ownership.

We then ran similar models to predict behavioural adjustment. Table 9 shows the result of the regression models.

Table 9: Predicting children's behavioural adjustment by poverty, family instability, family demographics and other indicators of deprivation, controlling for child characteristics (child age, sex, and ethnicity)

	Model 1		Model 2		Model 3		Model 4	
Poverty exposure (Ref: none)	B	SE	B	SE	B	SE	B	SE
Once	.21*	.03			.14*	.03	.08#	.03
Twice	.46*	.04			.33*	.04	.12*	.04
3 times	.63*	.04			.44*	.04	.10#	.05
Family status at birth (Ref: married)								
Single			.24*	.03	.17*	.03	.14*	.03
Cohabit			.55*	.04	.30*	.04	.19*	.04
Family transitions (Ref: none)								
1			.09#	.03	.06	.03	.03	.03
2+			.25*	.06	.14#	.05	.11#	.04
Other risks								
Young mother (W1)							.04	.06
Parents no education (W1)							.31*	.06
Low social class (W1)							.13*	.03
Workless household (W1)							.21*	.04
No housing tenure (W1)							.18*	.03
Overcrowding (W1)							-.03	.04
3+ sibs (W1)							-.01	.06
Area deprivation (W1)							.12*	.03
R^2	.07		.07		.09		.12	

Table Notes: * p<0.000; # p<0.001; $ p<0.005

The findings suggest that repeated and persistent poverty also has a significant association with behavioural adjustment at age 5. However, poverty explains less variation in behavioural adjustment than in cognitive ability. There is also a significant association between family structure and family instability and behavioural adjustment (Model 2). Both poverty and family structure and instability explain about the same amount of variation in the outcome. Model 3 suggests that poverty as well as family structure and more than 2 family transitions between waves 1-3 are independently associated with increased risk of behaviour problems. Furthermore, Model 3 suggests that the association between poverty

and behavioural adjustment can be partly explained through variations in family structure and instability, as indicated by the reduced association between poverty and behaviour adjustment. The associations between poverty, family structure and instability and behavioural adjustment remain significant after adding the additional risk factors (Model 4). Moreover, Model 4 suggests independent risk effects of the additional risk factors: over and above effects of poverty, family structure and family instability these factors show a significant risk effect. In particular, parental education and social class, parental worklessness, housing tenure and area deprivation appear to play a significant role in shaping the behavioural adjustment of the child.

3.5. Cumulative risk effects

To gain a better understanding of the impact of multiple risk exposure for children's wellbeing we created an overall socio-demographic risk index combining dichotomised indicators of the 11 risk factors included in the previous models (see also Table 6). The Index of Multiple Risks comprises exposure to poverty at 3 time points (11% in the analytic sample), single parent at birth (13.5%), 2+ family transitions (4.7%), teenage parenthood (4.3%), no educational qualifications (6.1%), low social status (19.1%), workless household (12.2%), rented housing (30.1%), overcrowding (7.5%), large family size (3.1%) and area deprivation (top quintile). We created a simple summary index of multiple risks (IMR). Table 10 shows that about 50 per cent of the sample experienced none of these socio-demographic risk factors, about a fifth experienced one, one in 10 experienced two, and about one fifth experienced deep risk of three risk factors or more.

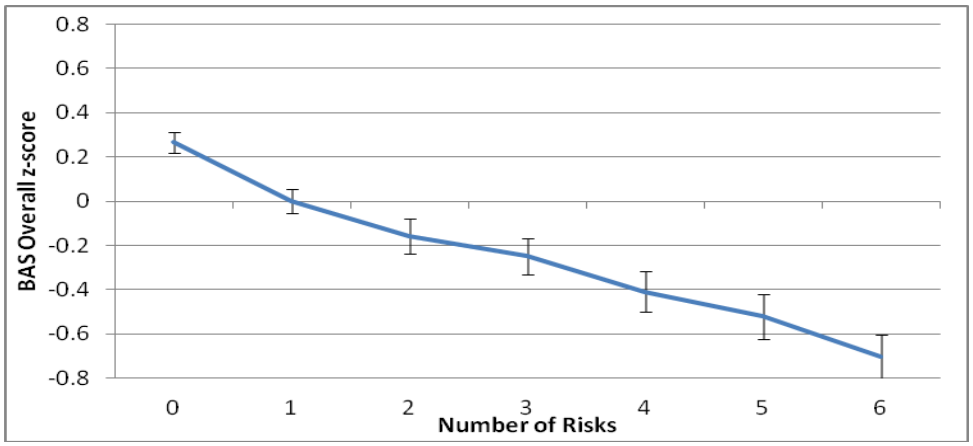
Table 10: Index of multiple risks (IMR) in the analytic sample (n=8,832)

Number of risks (range 0-11)	**%**
0	53.6
1	18.2
2	8.5
3	6.4
4	4.8
5	3.9
6+	4.4

In a next step we tested the association between exposure to multiple risks and children's outcomes at age 5. Figure 14 shows the relation of the number of risks on the index with the

overall BAS general cognitive ability score, giving the means and the 95% confidence intervals for the means. There is a very clear trend for a higher number of risks to be associated with lower ability scores. Each additional risk factor is associated with a further reduction in ability scores, although (as the confidence intervals suggest), at the higher end of the Index of Multiple Risks scale (i.e 2+ risk factors) the differences in scores are not statistically significant for each additional risk, maybe pointing to a ceiling effect.

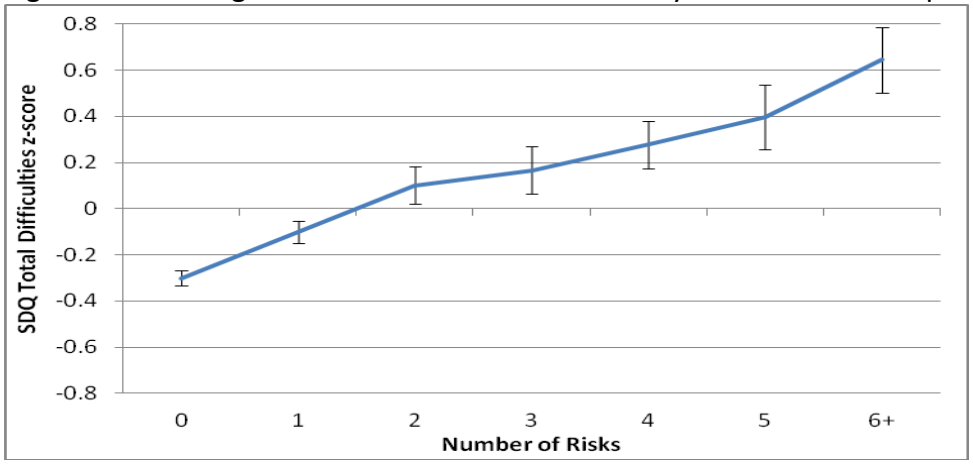
Figure 14. Child Age 5 BAS general cognitive ability score (combining naming vocabulary, picture similarities and pattern construction) by the Index of Multiple Risks



We also examined the associations between the IMR and each of the BAS subscales separately. The results are given in the Appendix (Appendix B). The findings suggest that the multiple risk index was associated with lower attainment levels across all 3 subscales comprising verbal and non-verbal skills, although verbal skills (i.e. naming vocabulary) are most strongly associated with multiple risk exposure.

In a next step we looked at the association between multiple risks and behavioural adjustment (note that here a high score indicates high behaviour problems). Figure 15 shows the association between multiple risk exposure and the SDQ Total Difficulties score. There is a trend for children exposed to more risk factors to have higher numbers of behaviour problems.

Figure 15. Child Age 5 SDQ Total Difficulties Score by the Index of Multiple Risks



We also looked at the separate subscales of the SDQ. The results are given in the Appendix (Appendix C). The findings suggest that the strongest association with the IMR are observed for conduct problems and hyperactivity. Prosocial behaviours are least affected by the multiple risks.

3.6. Promotive and protective factors and processes

We now turn to look at potential 'resource' factors that may help children to function effectively, to develop their cognitive ability and behavioural adjustment despite experiencing multiple risks in early life. Not all children respond in the same way to risk exposure (Rutter, 1979, 1990), and some children are able to function effectively even when experiencing severe adversity. Past studies have identified a number of potential resource factors, or resilience correlates (Masten, 2009, 2011) that can enable children to beat the odds and to show positive adjustment in the face of adversity. These factors include characteristics of the individual, the family, and the wider social context (Garmezy, 1991; Masten & Coatsworth, 1998; Rutter, 1990; Werner & Smith, 1992).

- *Child characteristics.* It has been argued that children may differ in their susceptibity to both positive and negative contextual influences as a result of factors associated with their biology, temperament, or other organismic factors, such as prematurity (Belsky & Pluess, 2009; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004) or attainment of early developmental milestones, such as gross- and fine motor development (Schoon, Cheng & Jones, 2010). For example, a good-natured, sociable temperament has been observed among young children who showed good cognitive and behavioural adjustment despite exposure to socio-economic adversity (Werner & Smith, 1992), and children demonstrating an easy temperament during infancy have been shown to develop fewer behaviour problems and maintain higher levels of academic attainment than those who show early adjustment problems (Caspi, 2000). In this study we therefore assess the role of early biological factors, such as birth weight and childhood motor and social skills (as reflected in the mastery of key developmental milestones), as well as indicators of early temperament, as potential protective factors. All of these characteristics have been shown to be associated with cognitive and behavioral adjustment, after controlling for socio-demographic risk factors (Flouri, Tzavidis, & Kallis, 2010; Murray, Jones, Kuh, & Richards, 2007; Schoon, Cheng, & Jones, 2010).

- *Parent characteristics and parent-child interactions.* Poverty has been associated with lower levels of parental mental health, warmth and responsiveness, (Conger, Conger, et al., 2010; Guo & Harris, 2000; Linver, et al., 2002; McLoyd, 1990). Furthermore, children growing up in poor families are less likely to be breastfed (Heikkila, Sacker, Kelly, Renfrew, & Quigley, 2011; Montgomery, Ehlin, & Sacker, 2006) and have less access to cognitively stimulating activities than children from non-poor families (Bradley, Corwyn, McAdoo, & Coll, 2001; Yeung, Linver, & Brooks-Gunn, 2002). All of these factors have, in

turn, been linked to children's adjustment, and it is likely that they can reduce the negative impact of cumulative risks on children's cognitive development and behavioural adjustment. Here we assess not the lack of these resources, but their presence, i.e. we assess the role of protective influences of maternal mental health and positive parent-child interactions.

- *Wider social context.* Although parents play a crucial role in socializing their children during the preschool period, there is also evidence that characteristics of the wider social context can influence children's developmental outcomes. Adaptive development during the preschool years can be fostered through access to formal child care, especially regarding the cognitive development of children growing up in poverty (Bradley & Vandell, 2007; Dearing, McCartney, & Taylor, 2009; George, Stokes, & Wilkinson, 2012). Furthermore there are associations between children's development and informal support systems within the community that can play a vital role in helping disadvantaged children and their parents cope with the ongoing stressors of a life in poverty (Coleman, 1988; Kohen, Dahinten, Leventhal, & McIntosh, 2008).

In our analysis we differentiate between two types of correlates or predictors of positive adaptation: a.) factors associated with better adaptation at all levels of risk (i.e. high and low risk exposure), which often have been termed assets, resources or compensatory factors (Garmezy, Masten & Tellegen, 1984; Scales et al. 2008) or *general promotive* factors (Gutman, Sameroff & Eccles, 2002); and b.) factors that have particular importance for positive adaptation at high levels of risk or adversity, which are termed *protective* factors (Luthar, Cicchetti & Becker, 2000; Rutter, 1979; 2006). While general promotive or resource factors have a beneficial effect in both high and low risk conditions, distinct protective factors show a protective effect especially in high risk conditions, i.e. there is an interactive relationship between the protective factor, the risk exposure and the outcome (Rutter, 2006). Regression models are used to test whether the effect of the risk variable reduces or disappears once the postulated protective variable is entered into the model. If the risk effect reduces, we identify a *general promotive* effect which shows an independent effect, over and above the role of multiple risk factors. If there is an interaction with the risk factor, i.e. the variable provides protection especially in high risk situations, we identify a *specific protective* effect.

Box 1 lists the correlates of positive adaptation examined in the analyses, comprising child characteristics, maternal mental health, parent-child interactions, child care arrangements and other characteristics of the wider social context. In our analysis we did not examine the role of parental mental health and parenting behaviour as risk factors, but as a potential resource factors that may reduce or eliminate the risks associated with exposure to multiple socio-economic risk factors on children's adjustment.

Box 1: Correlates of positive adaptation examined in the analyses

Child Characteristics (wave 1)	**Child care arrangements (waves 1-2)**
Birthweight	At age 9 months
Early temperament	• No care
Crying baby	• Formal (Group) care only
Gross-motor delay	• Informal (Non-group) care only
Fine motor delay	• Formal and informal care
Communicative gestures delay	At age 3 years
	• No care
Maternal Mental Health (waves 1-3)	• Formal (Group) care only
Maternal mental health at 9 months	• Informal (Non-group) care only
Maternal mental health at 3 years	Formal and informal
Maternal mental health at 5 years	**Social Networks (wave 3: age 5 years)**
	Friends with other parents in the area
Parent-Child Interactions (waves 1-2)	Family and friends live nearby
Child was breast fed	Safe area for kids
Warm parent-child relationship (Pianta)	Good area for raising kids
Regular bed times	
Regular meal times	
Discipline	
Reading to the child	
Joint family activities	

3.6.1. Availability of resource factors in the face of repeated poverty and family instability

In a first step we examined variation in the distribution of potential resource factors among families experiencing repeated poverty. Table 11 shows the selected resource factors by experience of poverty. The numbers in the tables are either proportions (in case of dichotomous variables or dummy coding) or z-scores (in case of continuous data).

Table 11. Resource Factors by Experience of Poverty

Resource Factor	Number of Sweeps Poor				Overall	
	Never	Once	Twice	3 times		
Birth weight (W1)	0.07	-0.03	-0.14	-0.21	0.00	z-score
Early temperament (W1)	0.09	-0.03	-0.10	-0.28	0.01	z-score
Crying baby (W1)	0.05	0.06	0.07	0.10	0.06	proportion
Gross motor development delay	0.02	-0.02	-0.01	-0.03	0.01	z-score
Fine motor delay (W1)	0.03	-0.01	-0.03	-0.14	0.00	z-score
Low maternal malaise (W1)*	0.13	-0.05	-0.12	-0.29	0.03	z-score
Low maternal depression (W2)*	0.16	-0.12	-0.24	-0.43	0.01	z-score
Low maternal depression (W5)*	0.14	-0.09	-0.21	-0.46	0.00	z-score
Child was breast fed (W1)	0.80	0.66	0.57	.049	0.72	proportion
Warm parent-child interaction (W2)	0.08	-0.08	-0.16	-0.35	-0.02	z-score
Child had regular bed times (W2)	0.13	-0.10	-0.17	-0.26	0.02	z-score
Child had regular meal times (W2)	0.07	-0.09	-0.12	-0.17	0.00	z-score
Parental discipline (W2)	0.04	0.05	-0.04	-0.05	0.02	z-score
Reading to the child (W2)	0.19	-0.08	-0.32	-0.46	0.03	z-score
Going to library (W2)	0.12	-0.08	-0.12	-0.19	0.03	z-score
Childcare at W1 (ref=no non-maternal care)	0.26	0.38	0.51	0.57	0.34	proportion
Group care only	0.10	0.04	0.03	0.05	0.08	proportion
Non-group care only	0.50	0.50	0.42	0.36	0.48	proportion
Group and non-group care	0.13	0.08	0.04	0.02	0.10	proportion
Childcare at W2 (ref=no non-maternal care)	0.08	0.17	0.25	0.31	0.14	proportion
Group care only	0.57	0.56	0.55	0.59	0.57	proportion
Non-group care only	0.07	0.06	0.06	0.03	0.06	proportion
Group and non-group care	0.28	0.20	0.14	0.07	0.23	proportion
Friends with other parents in the area (5 yrs)	0.92	0.87	0.87	0.86	0.90	proportion
Family and friends live nearby (5yrs)	0.88	0.89	0.87	0.85	0.88	proportion
Safe area for kids (5yrs)	0.15	-0.04	-0.32	-0.50	0.00	z-score
Good area for raising kids (5yrs)	0.24	-0.04	-0.37	-0.63	0.04	z-score

The findings suggest, as would be expected, that children who experienced poverty tended to have lower levels of resources than children not exposed to poverty. For example, compared to children who never experienced poverty children exposed to persistent poverty had lower birth weight, had more fine motor delays, and were less likely to have been breast fed. Their mothers were more depressed, showed lower levels of warm and supportive parent-child interactions, did not observe regular meal and bed times, were less likely to take their children to the library, and less likely to use formal or informal child care arrangements. Furthermore, their parents rated the area they were living in as not particularly safe or good areas for raising children.

Table 12. Resource Factors by Family Instability

Resource Factor	Number of Relationship Changes			Overall	
	None	One	Two		
Birth weight (W1)	0.03	-0.07	-0.10	0.00	z-score
Early temperament (W1)	0.02	-0.03	0.02	0.01	z-score
Crying baby (W1)	0.06	0.07	0.07	0.06	proportion
Gross motor development delay	-0.01	0.12	0.05	0.01	z-score
Fine motor delay (W1)	0.00	0.00	-0.07	0.00	z-score
Low maternal malaise (W1)*	0.07	-0.11	-0.06	0.03	z-score
Low maternal depression (W2)*	0.07	-0.16	-0.27	0.01	z-score
Low maternal depression (W5)*	0.06	-0.17	-0.28	0.00	z-score
Child was breast fed (W1)	0.75	0.64	0.63	0.72	proportion
Warm parent-child interaction (W2)	0.01	-0.12	-0.14	-0.02	z-score
Child had regular bed times (W2)	0.05	-0.05	-0.14	0.02	z-score
Child had regular meal times (W2)	0.03	-0.08	-0.13	0.00	z-score
Parental discipline (W2)	0.01	0.05	0.01	0.02	z-score
Reading to the child (W2)	0.08	-0.12	-0.21	0.03	z-score
Going to library (W2)	0.07	-0.06	-0.12	0.03	z-score
Childcare at W1 (ref=no non-maternal care)	0.33	0.36	0.41	0.34	proportion
Group care only	0.09	0.05	0.04	0.08	proportion
Non-group care only	0.47	0.49	0.48	0.48	proportion
Group and non-group care	0.10	0.10	0.06	0.10	proportion
Childcare at W2 (ref=no non-maternal care)	0.13	0.16	0.19	0.14	proportion
Group care only	0.58	0.53	0.58	0.57	proportion
Non-group care only	0.06	0.07	0.05	0.06	proportion
Group and non-group care	0.23	0.24	0.18	0.23	proportion
Friends with other parents in the area (5 yrs)	0.92	0.86	0.85	0.90	proportion
Family and friends live nearby (5yrs)	0.88	0.87	0.84	0.88	proportion
Safe area for kids (5yrs)	0.03	-0.13	-0.09	0.00	z-score
Good area for raising kids (5yrs)	0.10	-0.19	-0.15	0.04	z-score

We also looked at the associations between family instability and the resource factors. Table 12 shows the resource factors by experience of poverty. The numbers in the tables are either proportions (in case of dichotomous data or dummy coding) or z-scores (in case of continuous data).

Again, as expected, there was a trend for children growing up in stable families to have higher levels of potential resource factors than those growing up in unstable families having two or more relationship changes.

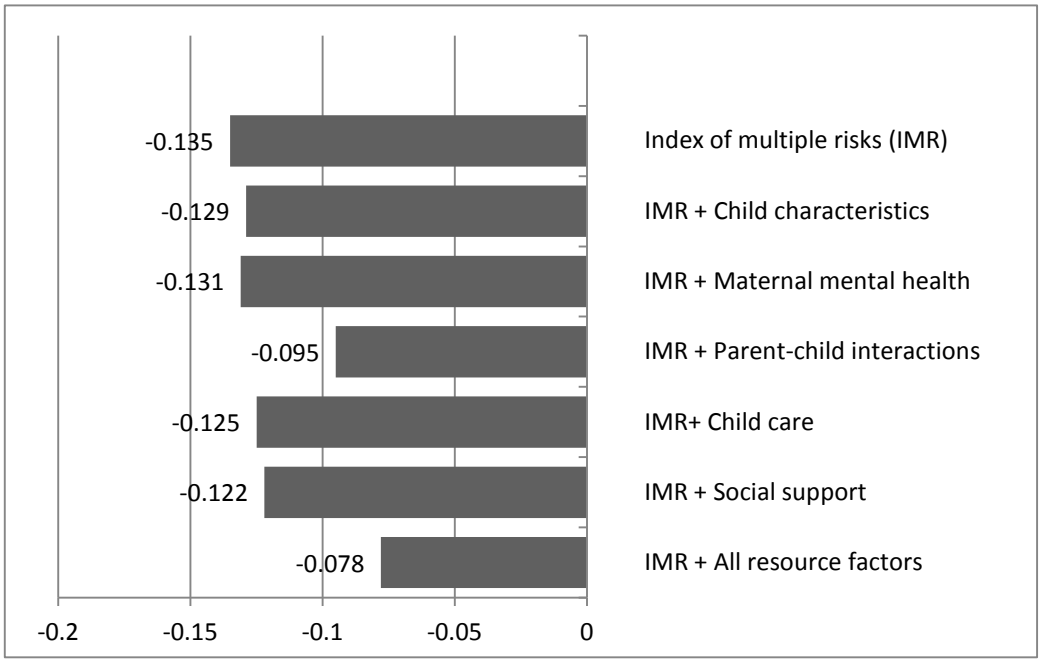
3.6.2. Association of resource factors with child adjustment

In a next step we assessed the role of the resource factors in reducing the association between the Index of Multiple Risks and child outcomes – that is, we assessed whether they functioned as general *promotive* factors. We ran separate models for different groups of indicators, examining the roles of the child's characteristics (birth weight, developmental milestones, early temperament), maternal mental health, characteristics of parent-child interactions (breast feeding, family routines), child care arrangements, and indicators of social support.

Figure 16 shows the regression coefficients from models assessing the relationship between the Index of multiple risks (IMR) and general cognitive ability at age 5, and how this relationship changes after adding the different sets of resource factors into the model. Greater values of the coefficient and larger bars indicate a stronger association between the IMR and the outcome. All models control for characteristics of the child (age, gender and ethnicity) to take into account early individual difference factors.

The first bar gives the association between the IMR and the general cognitive ability score. The next bar shows the relationship between the IMR and general cognitive ability after adding child characteristics to the model. We see that the bar is only slightly smaller, which suggests that child characteristics play only a small role in reducing the association between the IMR and cognitive ability – which remains significant. The remaining bars show the association between IMR and cognitive ability after adding indicators of maternal mental health, parent-child interactions, experience of child care, and social support in the neighbourhood to the model, as well as considering all protective factors together. We ran separate models to see which group of factors was associated with the greatest reduction in the risk effect. Although we can see that some of the resource factors, in particular parent-child interactions, reduced the association between multiple risks and cognitive adjustment, none completely removed the risk. The greatest reduction in the risk effect was associated with warm parent-child interactions and the addition of all resource factors simultaneously to the model. Including all the resource factors reduced the risk effect by over 40%.

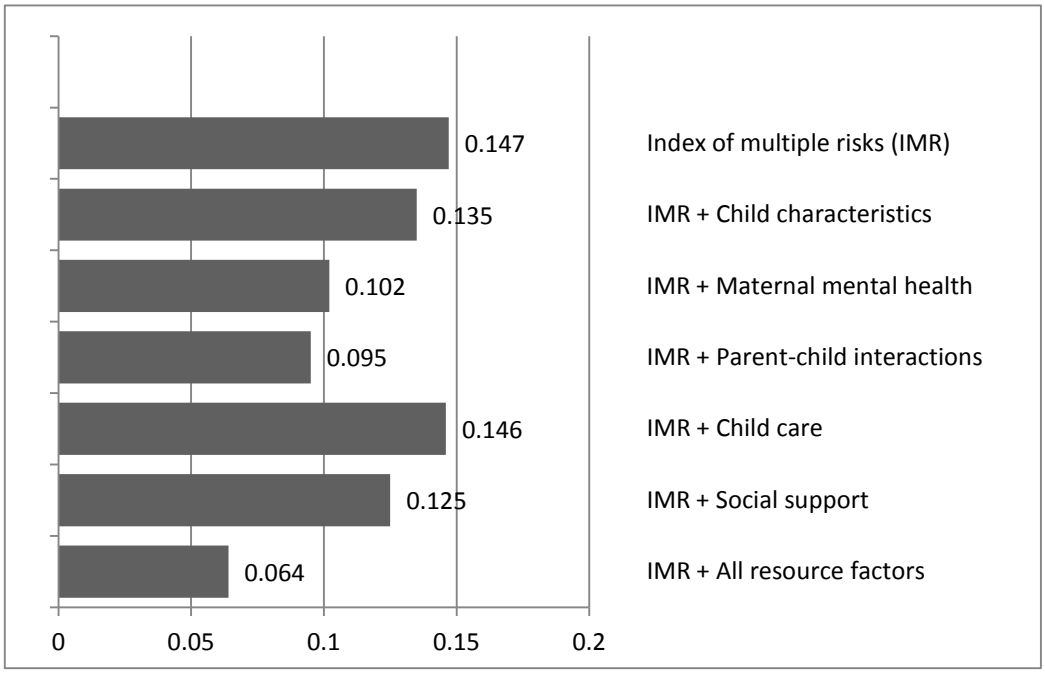
Figure 16. Predicting general cognitive ability (g-score from the BAS). Standardised Beta coefficients from the multiple regression models



In a next step we ran similar models to assess the association between the IMR and behavioural adjustment, examining the role of different sets of resource factors in reducing the negative risk effect of the cumulative risks on children's behavioural adjustment. Figure 17 shows the regression coefficients from the models assessing the relationship between the Index of multiple risks (IMR) and behavioural adjustment at age 5 years, and how this relationship changes after adding the different sets of resource factors into the model. Greater values of the coefficient and larger bars indicate a stronger association between the IMR and the outcome. All models control for characteristics of the child (age, gender and ethnicity) to take into account early individual difference factors.

The findings suggest that exposure to multiple risks has a somewhat greater impact on behavioural than cognitive adjustment (as indicated in a Beta coefficient of .147 versus .135). We also see that that maternal mental health and the quality of the parent-child relationship bring the greatest reduction in the risk effect, as does the consideration of all resource factors together. However, the association between the IMR and behavioural adjustment remains significant, even after adding all resource factors to the model. This means that the protective factors cannot completely offset the risk, yet they can reduce the risk effect by nearly 60%.

Figure 17. Predicting behavioural adjustment (SDQ total score). Standardised Beta coefficients from the multiple regression models



To assess the independent contributions of the Multiple Risk Index and the different resource factors we ran a multivariate OLS regression model including all variables simultaneously. The model was run separately for cognitive ability (g score derived from the BAS) and behavioural adjustment (SDQ total score) at age 5 years. We checked for multicollinearity in the predictor variables and found this not to be a problem (the highest correlations were below .5). Table 12 shows the Standardised Beta coefficients and standard error for each variable included in the two models.

Table 13. Predicting cognitive ability and behavioural adjustment at age 5 years: Multivariate OLS Regression Model

	Cognitive Ability		Behavioural Adjustment	
	B	SE	B	SE
Multiple Risk Index	-0.078***	0.007	0.064***	0.007
Birth weight (W1)	0.063***	0.019	-0.064***	0.019
Early temperament (W1)	0.000	0.002	-0.004$	0.002
Crying baby (W1)	0.071	0.043	0.042	0.043
Gross motor development delay	0.116***	0.017	-0.063***	0.017
Fine motor delay (W1)	0.064#	0.020	-0.032	0.018
Low maternal malaise (W1)*	-0.014	0.027	0.016	0.026
Low maternal depression (W2)*	0.004	0.007	-0.029***	0.008
Low maternal depression (W5)*	-0.003	0.004	0.004	0.004

Child was breast fed (W1)	0.003	0.004	-0.049***	0.004
Warm parent-child interaction (W2)	0.148***	0.025	0.024	0.02
Child had regular bed times (W2)	0.008***	0.002	-0.043***	0.002
Child had regular meal times (W2)	0.056***	0.013	-0.030$	0.012
Parental discipline (W2)	0.004	0.017	-0.058***	0.017
Reading to the child (W2)	0.004	0.002	-0.011***	0.002
Going to library (W2)	0.088***	0.012	-0.064***	0.013
Childcare at W1 (ref=no non-maternal care)	0.038***	0.008	-0.032***	0.007
Group care only				
Non-group care only	0.196***	0.038	-0.021	0.037
Group and non-group care	0.028	0.025	0.038	0.023
Childcare at W2 (ref=no non-maternal care)	0.114#	0.041	0.005	0.034
Group care only				
Non-group care only	0.000	0.033	-0.031	0.033
Group and non-group care	0.122$	0.052	-0.072	0.039
Friends with other parents in the area (5 yrs)	0.031	0.039	-0.031	0.036
Family and friends live nearby (5yrs)	0.038	0.037	-0.065	0.035
Safe area for kids (5yrs)	-0.038	0.037	0.019	0.033
Good area for raising kids (5yrs)	0.010	0.016	-0.014	0.017
	0.048#	0.017	-0.028$	0.014
Constant	-6.780***	0.332	6.283***	0.303
R^2	0.18		0.33	

Note. Both models control for child sex, age, and ethnicity. $^{\$}$ $p < 0.05$, $^{\#}$ $p < 0.01$, *** $p < 0.001$

The findings suggest a number of resource factors that were included in the model show a promotive effect across domains, i.e. they are associated with positive adaptation despite the experience of adversity (comprising low or high levels of risk). Please note that for cognitive development a positive score signifies a positive influence, i.e. high cognitive ability in the face of multiple adversities, while for behavioral adjustment a negative association indicates a promotive influence, associated with fewer behavior problems in the face of adversity. For both cognitive ability and behavioural adjustment we find a significant association with birth weight, gross motor development, warm parent-child interactions, regular bed times, reading to the child, going to the library, and living in a good area for

raising kids. These factors show a significant association over and above the influence of multiple adversities. Promotive factors regarding cognitive development are fine motor development, breast-feeding and early child care (in particular group care at age 9 months). For behavior development early temperament, maternal depression (in particular at age 9 months and 5 years), regular meal times, and use of gentle discipline (no harsh parenting) play a significant role over and above the experience of multiple adversity.

3.6.3. Interaction effects – tests for protective factors

To assess whether any of the resource factors significantly interacted with exposure to multiple risks (IMR) – that is, whether they functioned as *protexctive* as well as *promotive factors* - the same regression models as above were run, including the main effects of the multiple risk index and the other variables included in Table 12, but this time including an interaction term between the IMR and each of the dichotomised potential protective factors. Separate analyses were run for each potential protective factor; in addition, for ease of interpretation we collapsed the IMR into 3 categories (no socio-demographic risks, 1-3 risk factors, and 4 or more risk factors). We found significant interaction effects for the experience of both formal and informal childcare at age 3 for both cognitive and behavioural outcomes. In addition we found domain-specific protective factors, including having family and friends live nearby, and living in safe area, which we beneficial for the cognitive development of children exposed to multiple risks. Regarding behavioural adjustment maternal mental health at age 5, a warm parent-child relationship, and childcare experience at age 9 months, all showed evidence of protective effects. Figures 18 to 25 illustrate the statistically significant interaction effects. First we look at interactions that were significant regarding general cognitive ability.

Figure 18: General cognitive ability by risk exposure and experience of childcare at age 3 years

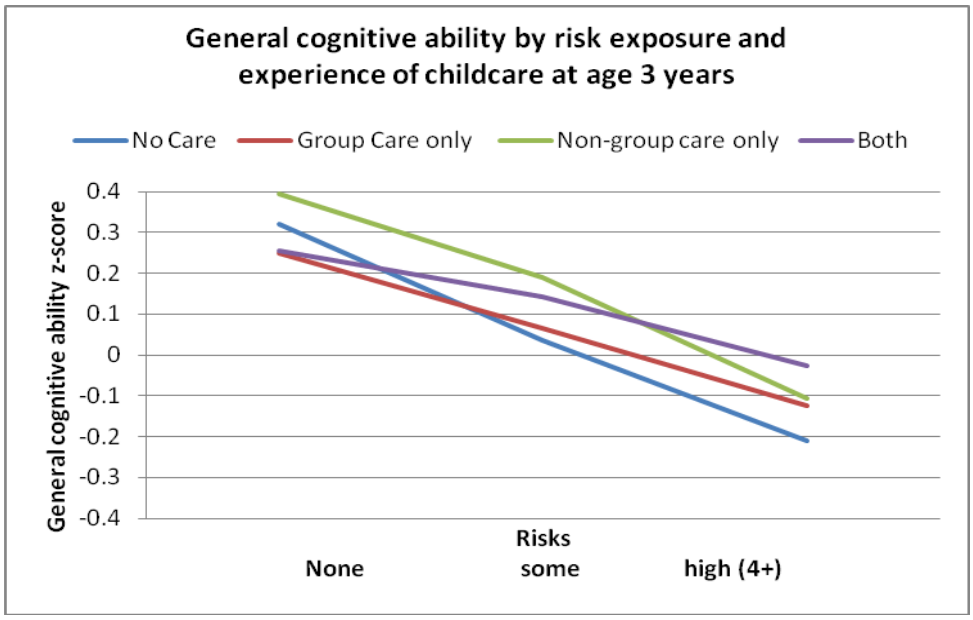


Figure 18 shows the interactions between risk exposure and experience of childcare at age 3 years on general cognitive ability at age 5, which was significant over and above effects of all the other variables included in the model. As shown in Figure 14, across the sample as a whole higher levels of risk exposure were associated with lower levels of cognitive ability at age 5 years. However, children growing up in high risk conditions (exposed to 4 or more of the socio-economic risk factors) who experienced both formal and informal childcare at age 3 showed higher levels of general cognitive ability than those in similar circumstances who experienced no out-of-home care at all. Exposure to formal and informal care at age 3 could thus be identified as a distinct protective factor for children exposed to high socio-economic adversity (Bradley & Vandell, 2007; Dearing, McCartney, & Taylor, 2009; George, Stokes, & Wilkinson, 2012)

Figure 19: General cognitive ability by risk exposure and having family and friends live nearby in the area

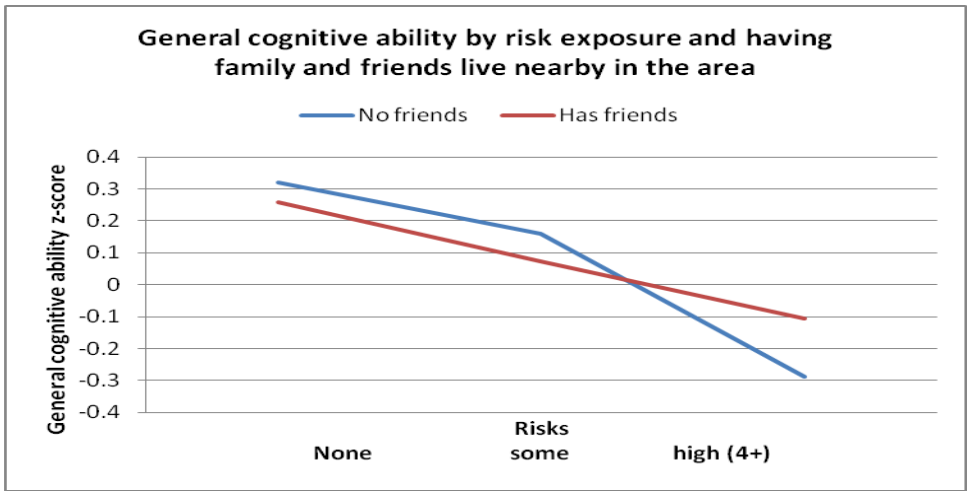
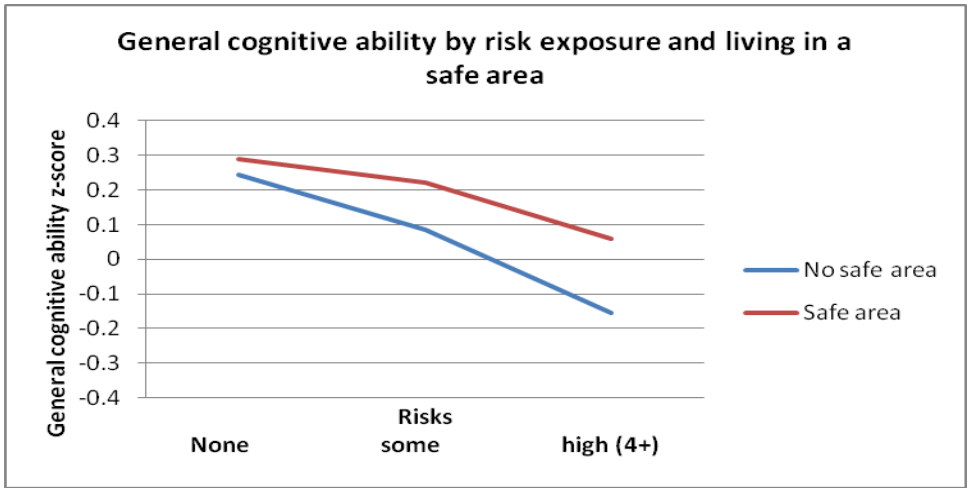


Figure 19 shows the interaction between risk exposure and having family and friends living nearby on general cognitive ability at age 5, which was statistically significant over and above effects of all the other variables included in the model. As Figure 19 shows, children exposed to high levels of socio-economic risk (4 or more of the socio-economic risk factors) who lived near family and friends showed higher levels of general cognitive ability than those who did not live near family and friends. Children growing up in high risk conditions thus appear to benefit from living near their family and friends, who might be able to provide additional support (maybe including childcare) and possibly also cognitive stimulation. The findings thus illustrate the importance of social networks for effective child development in disadvantaged areas (Coleman, 1988; Furstenberg & Hughes, 1995; Kohen et al., 2008; Renzaho, Richardson & Strugnell, 2012).

Figure 20: General cognitive ability by risk exposure and living in a safe area



We also found a significant interaction between risk exposure and living in a safe area regarding general cognitive ability at age 5. As Figure 20 shows, children exposed to high

levels of socio-economic risk (4 or more of the socio-economic risk factors) who lived in a safe area showed higher levels of general cognitive ability than those who did not live in a safe area. The measure of living in a safe area was based on a single item, using parental report. Nonetheless, it appears to point to the importance of neighbourhood characteristics for child development, as also demonstrated in a randomized controlled trial conducted with preschoolers in the Chicago School Readiness Project. Comparing children's functioning in the classroom setting when exposed to recent local violence with scores when no recent violence had occurred suggested that local violence can generate acute psychological distress among caregivers and impair children's self-regulatory behaviour and cognitive functioning (Sharkey et al., 2012).

The remaining Figures examine significant interactions regarding general behavioural adjustment at age 5 years. In interpreting the findings it has to be kept in mind that, unlike cognitive ability which was directly measured, children's behavioural adjustment was assessed via maternal reports.

Figure 21: SDQ Total Difficulties by risk exposure and gross motor development at age 9 months

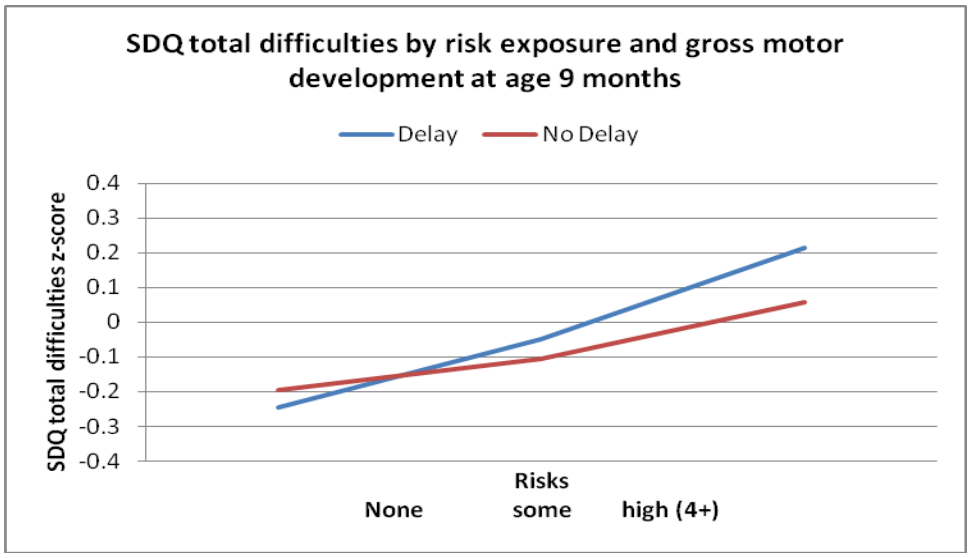


Figure 21 shows the interaction between risk exposure and gross motor development by age 9 months, which was significantly associated with the SDQ Total Difficulties score over and above the effects of all other variables included in the model. As Figure 21 shows, children exposed to high levels of socio-economic risk (4 or more of the socio-economic risk factors) who showed no delay in their gross motor development at age 9 months showed lower levels of behaviour problems than those in similar circumstances who were delayed at that age. Early gross motor development thus seems to be a protective factor regarding the behavioural development of children growing up in high risk conditions.

Figure 22: SDQ Total Difficulties by number of risks and maternal depression at age 5

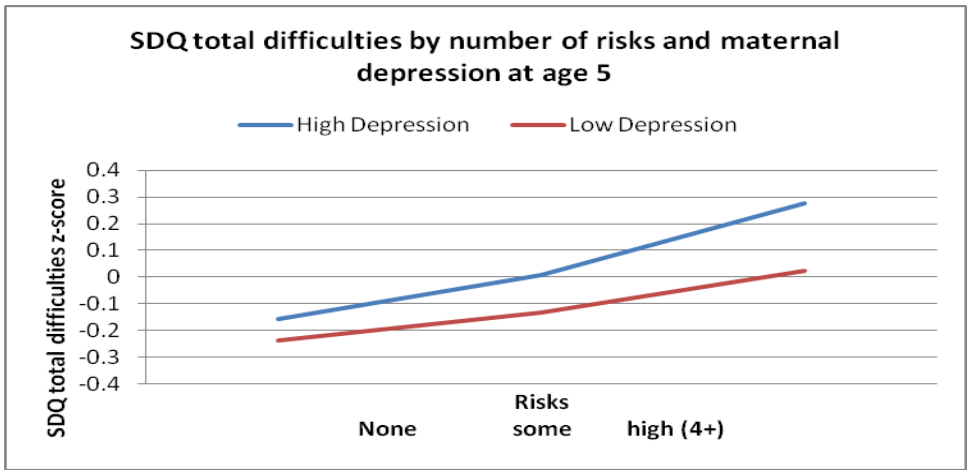


Figure 22 shows the interaction between risk exposure and maternal depression at age 5 years, which was significantly associated with the SDQ Total Difficulties score over and above effects of all the other variables included in the model. As Figure 22 shows, children exposed to high levels of socio-economic risk (4 or more of the socio-economic risk factors) whose mother reported low levels of depressed mood when the child was 5 years old showed lower levels of behaviour problems than those in similar circumstances whose mother reported high levels of depression. Maternal mental health thus seems to be a protective factor regarding the behavioural development of children growing up in high risk conditions (see also Conger et al., 2010; McLoyd, 1990). In interpreting this finding, however, it has to be kept in mind that both the measures of maternal mental health and the child's behavioural adjustment are based on maternal report, which could imply that there is a shared reporter effect. The same applies to the measure of the quality of the parent-child relationship (see Figure 23).

Figure 23: SDQ Total Difficulties by risk exposure and quality of parent-child relationship (Pianta)

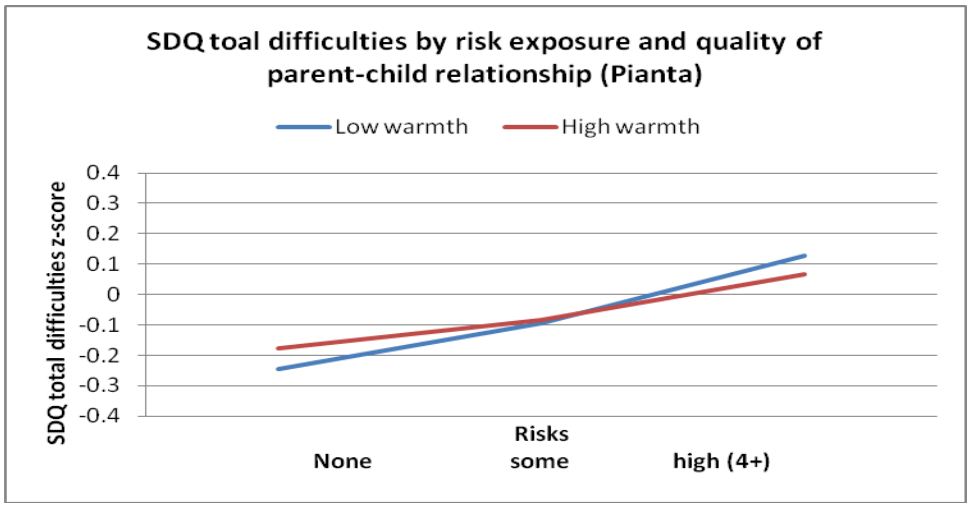
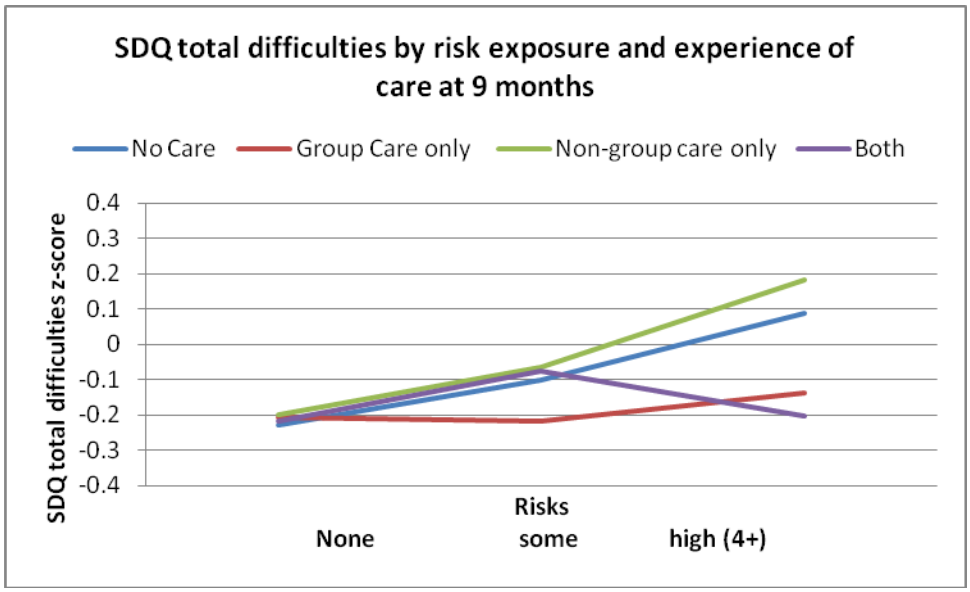


Figure 23 shows the interaction between risk exposure and the quality of the parent-child relationship at age 5 years, which was significantly associated with the SDQ Total Difficulties score over and above effects of all the other variables included in the model. As Figure 23 shows, children exposed to high levels of socio-economic risk (4 or more of the socio-economic risk factors) who experienced warm and supportive parent-child interactions showed lower levels of behaviour problems than those in similar circumstances growing up in a less supportive environment. The quality of the parent-child relationship thus seems to be a protective factor regarding the behavioural development of children growing up in high risk conditions (see also Conger et al., 2010).

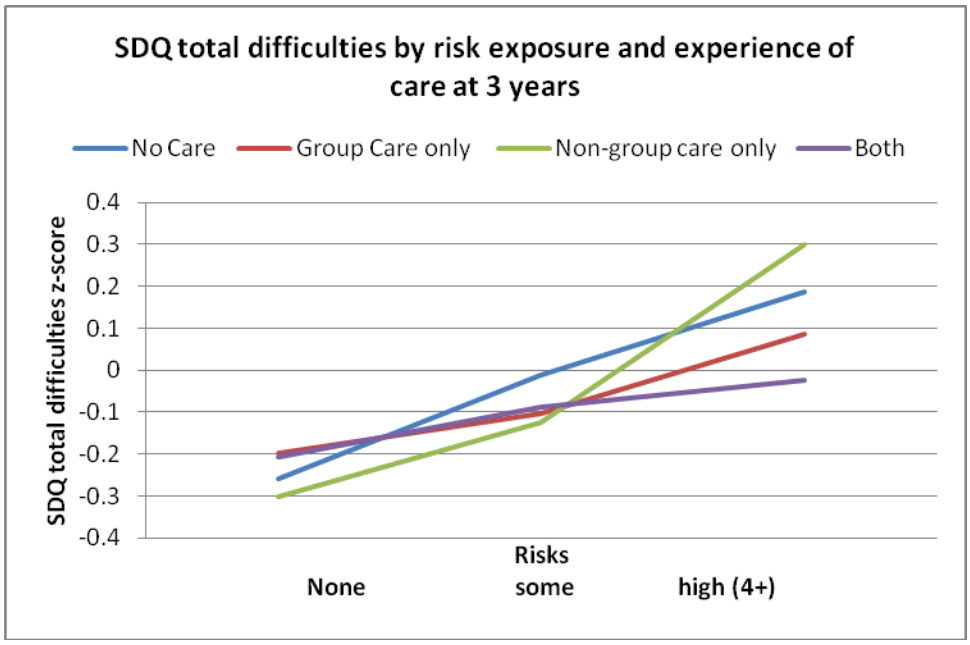
Regarding behavioural adjustment the experience of child care at both 9 months and 3 years was significantly associated with behavioural adjustment at age 5 years, over and above all other variables included in the model. Figures 24 and 25 show the interaction between risk exposure and experience of childcare at age 9 months and 3 years for behavioural adjustment at age 5 years; as they show, non-maternal care is significantly associated with reduced levels of behaviour problems.

Figure 24: SDQ Total Difficulties by risk exposure and experience of childcare at 9 months



Children growing up in high risk conditions (exposed to 4 or more of the socio-economic risk factors), who experienced either formal care only or both formal and informal care at age 9 months showed lower levels of behaviour problems at age 5 years than those in similar circumstances who experienced only informal care or no non-maternal care at all. Exposure to either formal care only or both formal and informal care at age 9 months could thus be identified as a distinct protective factor regarding the behavioural adjustment of children exposed to high levels of socio-economic adversity.

Figure 25: SDQ Total Difficulties by risk exposure and experience of childcare at 3 years



As shown in Figure 25, children growing up in high risk conditions (exposed to 4 or more of the socio-economic risk factors), who experienced both formal and informal childcare at age 3 showed lower levels of behaviour problems than those in similar circumstances who experienced only informal care or no non-maternal care at all. Regarding behavioural adjustment, exposure to both formal and informal care at age 3 could thus be identified as a distinct protective factor for children exposed to high socio-economic adversity.

5 Summary and Conclusion

At the turn of the millennium about 40 per cent of children experienced poverty at least once and 1 in ten children in the UK were growing up in persistent poverty during their first 5 years of life. Children exposed to poverty also had a greater risk of experiencing family break up and instability, or were living in a single parent household. They generally had to face a less advantageous environment than children from better-off households, characterised by exposure to multiple other potential socio-demographic risk factors including parental worklessness, overcrowding and area deprivation.

Parental poverty, in particular repeated exposure to poverty, as well as family instability were both significant risk factors, associated with lower levels of cognitive and behavioural adaptation of children. Poverty had a slightly stronger association with cognitive adjustment than with behaviour. The strongest associations were apparent between poverty and verbal skills (i.e. naming vocabulary), as well as conduct problems, hyperactivity and peer problems. Prosocial behaviour was least affected by the experience of poverty.

Timing and duration of hardship matters

The findings furthermore suggested that the timing and duration of hardship mattered, with strongest effects seen for persistent exposure to poverty, as well as for poverty exposure during the first year of life. Poverty was associated with a number of other problem factors, such as family instability, low parental education and social status, parental worklessness, rented housing, overcrowding and area deprivation. These risk factors, in turn, showed an independent association with child outcomes across domains. While single risk factors showed rather small associations with the indicators of child adjustment, it is the accumulation of risks that had the strongest impact.

The role of family instability

Family instability during a child's first five years of life can explain some, but not all of the association between poverty and child adjustment. The role of family structure and stability appeared to be somewhat more important in supporting behaviour adjustment than cognitive development in the face of economic hardship. Regarding behaviour adjustment, family structure and instability remained significantly associated with the outcome, even after controlling for poverty exposure and a number of additional risk factors. This suggests that domain specific risk effects may need to be considered when planning or designing appropriate intervention programs.

Cumulative risks

It is usually not a single factor, but the combination and accumulation of risks that negatively affect an outcome. Furthermore, risk factors rarely occur in isolation, and typically children with high risk are exposed to multiple adversities over an extended time

period. Considering multiple risks, for example by constructing a summary index of multiple risks, gives a better appreciation of the risks faced by a family than looking at individual risk factors on their own. The more risk factors the child is exposed to, the more difficult it becomes to function effectively and to fully develop one's potential. Both cognitive and behavioural development were associated with our multiple risk index, although it appeared that at age 5, behavioural adjustment was more strongly affected by multiple socio-economic risks than cognitive adjustment. The overall effect of persistent poverty and that of multiple socio-economic risk exposure on children's adjustment at age 5 years was however relative small (explaining about 10 to 14 % of the variance). This finding is confirmed in other studies using the MCS (Washbrook, 2010; Waldfogel & Washbrook, 2010), suggesting that other factors, such as parental mental health or abuse may also be important during the first five years of life in shaping children's adjustment. Nonetheless, exposure to poverty during the early years has shown to be associated with developmental continuity of poor adaptation (Brooks-Gunn & Duncan, 1997; Rutter, 1979, 2006; Sameroff, 2010; Schoon, 2006) pointing to the importance of early interventions.

Protective and promotive factors

We could identify a number of factors that were associated with effective functioning in high and low risk circumstances. These comprised general promotive or resource factors that were associated with better adaptation at all levels of risk, such as birth weight, gross motor development, warm parent-child interactions, regular bed times, reading to the child, going to the library, and living in a good area for raising kids. These factors were associated with effective functioning for both cognitive and behavioural adaption in high and low risk conditions. In addition to these general promotive factors, we also found domain specific promotive factors that support specifically cognitive versus behavioural adaptation. Regarding cognitive adaptation we found significant associations with early fine motor development and breast feeding. For behaviour adjustment maternal mental health, regular meal times, and non-harsh parental discipline also played a significant role. The child's adjustment is facilitated or supported the more of these promotive factors are available. Our findings support previous studies showing that parent-child relationships and the home learning environment are crucial factors in explaining the association between poverty and children's adjustment (Dearden, et al., 2011; Goodman & Gregg, 2010; Gregg, et al., 2008; Washbrook, 2010). What our study added are the findings regarding the importance of early physical development and neighbourhood characteristics. Moreover, we could identify distinct protective factors that seemed to have particular importance for positive adaptation at high levels of adversity. These protective factors included the experience of both formal and informal child care which was important for both cognitive and behavioural adjustment of children exposed to multiple adversity (high risk). Regarding cognitive ability we also found a significant role of having family and friends live nearby and living in a safe area in supporting high risk children, pointing to the importance of the wider social context in which children are growing up. Regarding behaviour adjustment we found significant

associations with indicators of gross-motor development, and maternal mental health, suggesting the importance of early physical and mental health.

Policy implications

Although based on longitudinal data, our findings cannot of course be taken to imply causality. In addition, we were unable to investigate the more detailed processes underlying the associations we observed. Nonetheless, our findings are consistent with a growing body of evidence, highlighting the importance of early interventions to promote children's wellbeing (see also Eisenstadt, 2011; Gross, 2008; Heckman, 2006; Hertzman et al., 2010; Sylva et al., 2010). Our findings suggest that such interventions should aim to build resources within the family, enabling children and their parents function effectively. Important areas to be addressed by intervention strategies include early childcare provision, family support and parent training programmes, and early detection of actual or potential developmental or behavioural problems. Furthermore, research on the factors enabling young children to develop their potential should not stop at the individual and family level, but aim to identify how to improve supportive structures in the wider social context, such as neighbourhood characteristics and access to social support networks (see also Coleman, 1988; Furstenberg & Hughes, 1995; Renzaho, Richardson & Strugnell, 2012; Sharkey et al., 2011). Our study has shown that social bonds are important, in particular the availabilty of friends and family in the local area as well as the provision of places that are safe for raising children.

The magnitude of risks encountered, and experiences within and outside the home play a significant role in shaping the child's development. The experience of poverty is associated with a number of additional risk factors that all have independent risk effects on children's adjustment. Our evidence suggested that policy needs to deal with a range of inter-linked problems. Targeting poverty on its own is unlikely to be successful. The findings have shown that families and children growing up in poverty experience multiple socio-economic risks, and have lower levels of protective resources than those living in more privileged circumstances. Poverty is associated with family instability, low levels of parental education and social class, parental worklessness, poor housing conditions and area deprivation. Moreover, it is associated with lower birth weight, early temperament problems, delay in developmental milestones, maternal depression, less effective parenting behaviour, less use of child care, and living in areas that are less safe and not good for raising children. Even if these psycho-social resources are available they cannot fully remove the negative influence of multiple socio-economic disadvantage. Programs aiming to improve the wellbeing of children must therefore address the elimination of critical socio-economic risk factors, in particular poverty, worklessness, poor housing conditions, and area deprivation, in addition to promoting the improvement of psycho-social and developmental resource factors. Key leverages for interventions include the provision of quality early child care and investment in local infrastructure.

Limitations of the study

In interpreting our findings and developing suggestions for policies some limitations of our approach have to be considered. Our research is based on secondary analysis of existing data rather than randomised trials. This means that we have not established robust causal relationships. It is likely that other, unmeasured factors that have not been included in our models can play a role. Furthermore, we had to make best use of the available data, and are limited by the quality of the collected data. This affected in particular our choice of potential protective factors, some of which were based on single item statements. As in all longitudinal studies we encountered missing data due both to survey loss and of incomplete responses. Response bias at the individual level would tend to underestimate the magnitude of effects of social disadvantage, as sample attrition is greatest among cohort members in more deprived circumstances (Plewis, Calderwood, Hawkes, Hughes, & Joshi, 2004). Thus, the results might provide a more conservative estimate of social inequalities in the sample.

Conclusion

Despite these concerns, the study contributes to a better understanding of how experiences of socio-economic disadvantage are affecting children's outcomes, especially regarding the timing and duration of risk effects, and to what extent these effects are mediated through different pathways comprising individual characteristics, characteristics of the family, and the wider social context. Our finding suggest the importance of a holistic aproach, taking into account the living conditions, as well as cognitive, behavioural, emotional, as well as biological aspects of development (see also Bartley, Schoon, Mitchell, & Blane, 2010; Brooks-Gunn, 1995; Luthar & Cicchetti, 2000; Schoon, 2006; Schoon & Bynner, 2003). We thus call for a more broad-based and multi-disciplinary approach to prevention, aiming at a.) the removal or reduction of socio-ecomomic risk factors (not just poverty but the interlinked problems that sit alongside to being poor); b.) provision of affordable childcare and education; c.) family support and parent training programmes; d.) early detection of actual or potential developmental and health problems; and e.) improvement of public infrastructure creating safe and supportive areas for bringing up children.

Our findings are consistent with the view that the most effective programs are likely to be those that are the most comprehensive and multifaceted, building up resources from inside the community and providing an integrated service delivery. There is, for example a need for holistic assessments, which during the early years could be delivered through health visitors who screen for developmental milestones, behavioural adjustment and biological risks (e.g. low birth weight) (see Department of Health, 2011; House of Commons, 2011). These assessments should also take into account parental health to support parents in their role as care givers in a stressful and demanding context. Early assessments should be accompanied by efforts to improve parent-child interactions and the home learning

environment, as well as providing access to good quality and affordable child care. Moreover, the living standards of poor families with children should be increased, including improvements in social housing, employment opportunities, and public infrastructure. Targeting poverty on its own is unlikely to be successful. One has to address the multiple issues that sit alongside being poor. This can be best achieved by investment in services that integrate education, health and social care, as suggested by the WHO, the UN, OECD and the European Commission (European Commission, 2012 ; OECD, 2011; UN, 2010; UNICEF, 2007, 2013; WHO, 2008)

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Appendix

A. Differences in risk factors by region

B. Index of Multiple Risk and Cognitive Ability (Results for BAS subscales)

C. Index of Multiple Risk and Behaviour Adjustment (Results for SDQ subscales)

A. Differences in risk factors by region

Given the significant role of area deprivation in shaping adjustment of children, we examined the association between areas in the UK and the risk factors included in the Index of Multiple Risks (IMR). Table A1 gives the association between the risk factors and the region in which the family lived in. There is variation in risk exposure by region, with those living in the east and south tending to have lower rates of exposure to these risks. Persistent poverty and single parenthood are especially prevalent in the North of England, Wales, and Northern Ireland. Highest rates of overcrowding are found in London and Scotland. Large families are most prevalent in Northern Ireland, and area deprivation is most pronounced in the North of England.

Table A1. Individual Risk Factors by Region of Residence (in %)

	Region							Overall
	North	Midlands	London	East & South	Wales	Scotland	Northern Ireland	
Persistent poverty	18.8	13.5	12.4	8.0	17.0	12.5	17.5	12.9
Single parent at birth	16.4	12.9	13.5	9.4	17.0	14.3	16.9	13.0
2+ family transitions	4.6	3.4	4.6	4.8	3.4	4.2	3.1	4.4
Young mother	6.8	3.9	2.6	2.4	6.6	4.2	4.1	4.1
Parents no education	6.6	5.4	5.5	2.6	6.4	4.8	6.8	4.7
Low social class	24.5	17.6	13.1	15.1	20.7	18.7	26.8	18.4
Workless household	16.5	14.2	14.0	14.0	15.1	12.3	13.8	13.0
Rented housing	30.6	26.8	32.3	29.0	31.2	29.7	27.2	29.5
Overcrowding	5.0	5.3	13.6	5.1	4.4	8.7	6.5	6.3
4+ sibs	3.0	2.7	1.7	2.4	2.5	3.0	3.9	2.6
Area deprivation (IMD)	32.8	20.2	20.1	7.8	19.9	18.5	20.9	18.4
N	1563	1060	735	2192	1410	1151	721	8,832

Table A2. shows the association between the Index of Multiple Risks with the region in which the family lived. A clear trend is difficult to discern, but children in the east and south were the most likely to have no risks and least likely to have six or more risks. Those in the north had the lowest rate of having no risks and the highest rate of having six or more risks.

Table A2. Index of Multiple Risks by Region of Residence (in %)

Number of Risks	Region							Overall
	North	Midlands	London	East & South	Wales	Scotland	Northern Ireland	
0	44.9	53.0	51.0	57.7	51.1	53.5	49.7	52.5
1	18.0	18.1	17.6	18.4	14.5	14.7	17.2	17.6
2	9.0	7.6	9.3	9.7	10.3	10.8	9.1	9.3
3	7.9	7.1	7.1	5.4	7.3	6.6	6.3	6.6
4	6.8	5.8	4.5	4.4	5.9	5.8	5.5	5.4
5	5.7	4.3	6.4	2.7	4.5	3.4	5.7	4.2
6+	7.7	4.2	4.0	1.7	6.5	5.2	6.6	4.4
N	1563	1060	735	2192	1410	1151	721	8,832

B. Index of Multiple Risk and Cognitive Ability (Results for BAS subscales)

Figures B1 to B3 show the relationship between the IMR and scores for each of the BAS subscales separately. The multiple risks are associated with lower attainment levels across all 3 subscales comprising verbal and non-verbal skills, although Figure B1 suggests that verbal skills (i.e. naming vocabulary) are most strongly associated with multiple risk exposure.

Figure B1. Child Age 5 BAS Naming Vocabulary Score by the Index of Multiple Risks

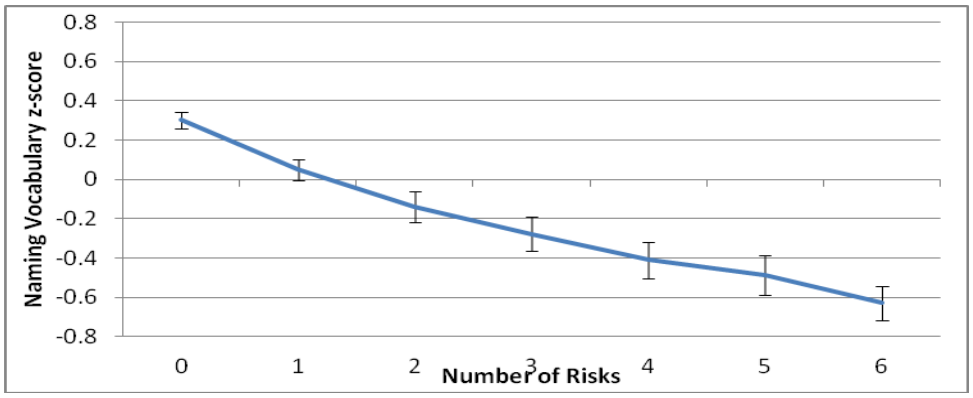


Figure B2. Child Age 5 BAS Picture Similarities Score by the Index of Multiple Risks

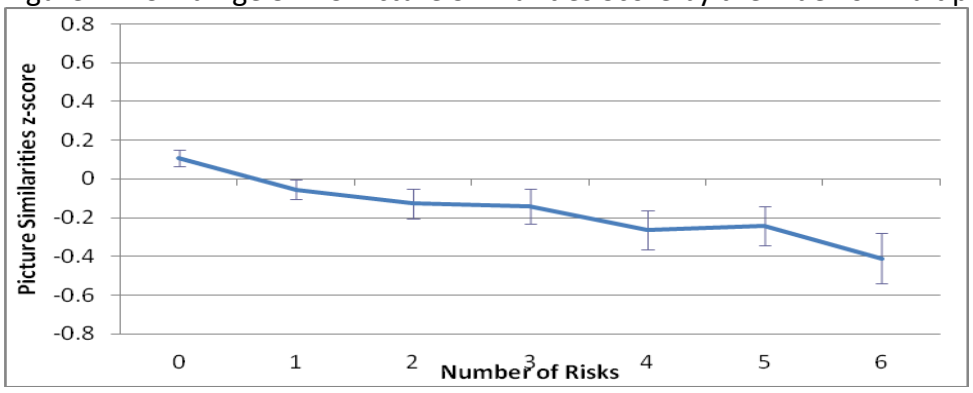
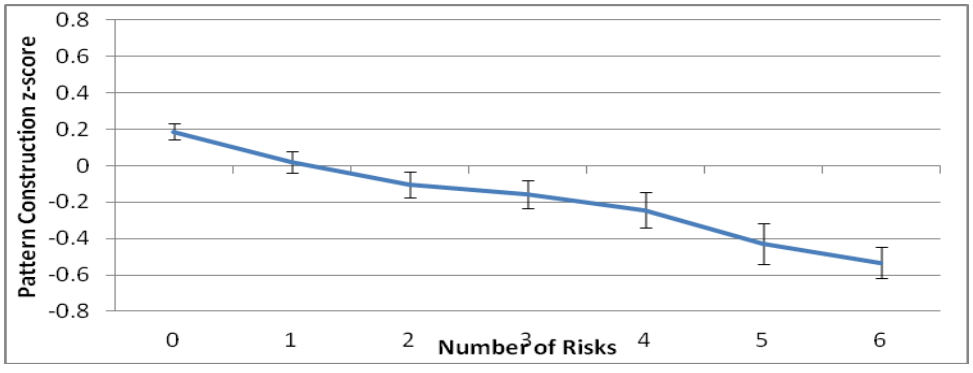


Figure B3. Child Age 5 BAS Pattern Construction Score by the Index of Multiple Risks



C. Index of Multiple Risk and Behaviour Adjustment (Results for SDQ subscales)

Figures C1 to C5 show the relationship between the IMR and scores for each of the SDQ subscales indicating behaviour problems separately. Note that a high score indicates high behaviour problems. The multiple risks are associated with higher behaviour problems across all 5 subscales. The strongest associations with the IMR are observed for conduct problems (Figure C1) and hyperactivity (Figure C2).

Figure C1. Child Age 5 SDQ Conduct Problems Score by Index of Multiple Risks

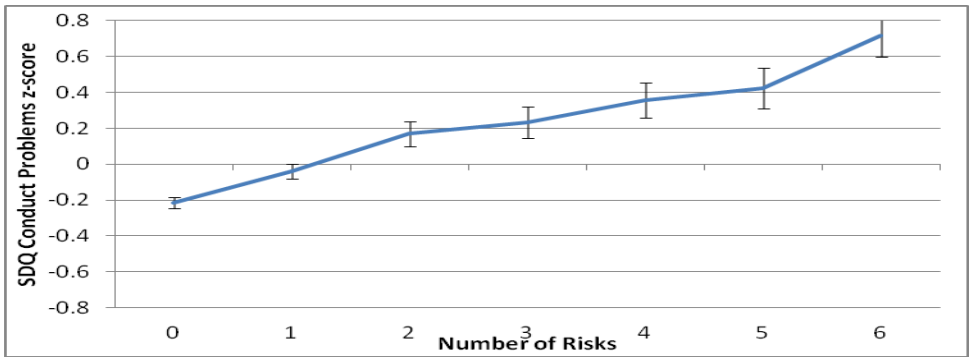


Figure C2. Child Age 5 SDQ Hyperactivity Score by the Index of Multiple Risks

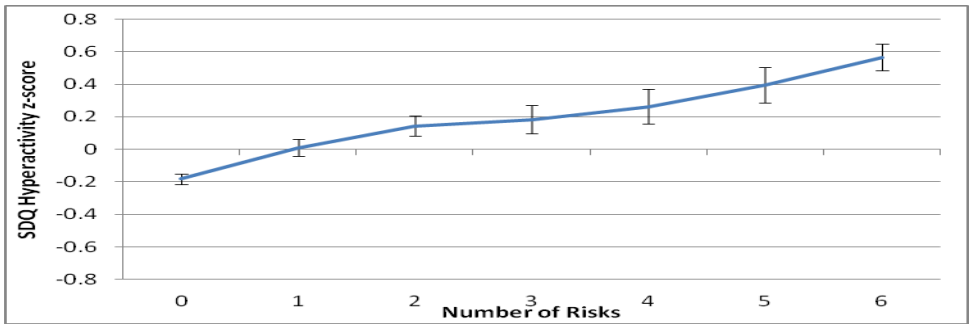


Figure C3. Child Age 5 SDQ Emotional Symptoms Score by Index of Multiple Risks

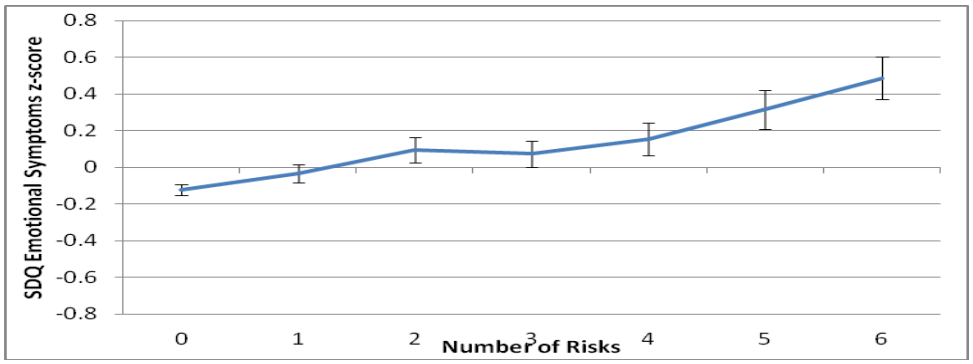


Figure C4. Child Age 5 SDQ Peer Problems Score by Index of Multiple Risks

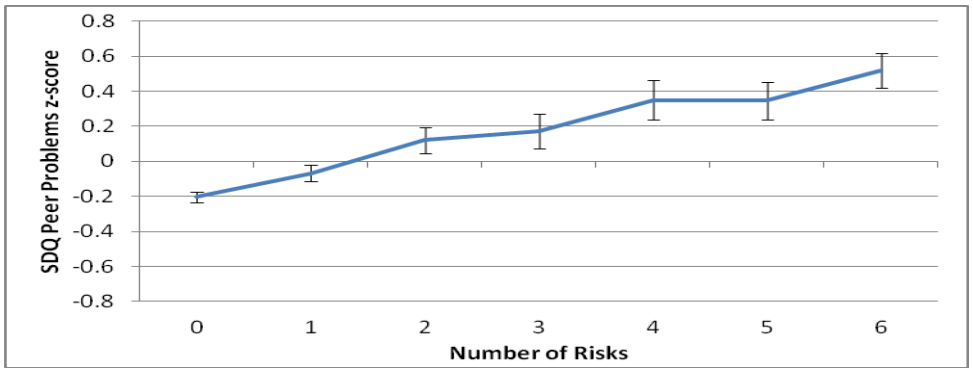


Figure C5. SDQ Prosocial behaviour by Index of Multiple Risks

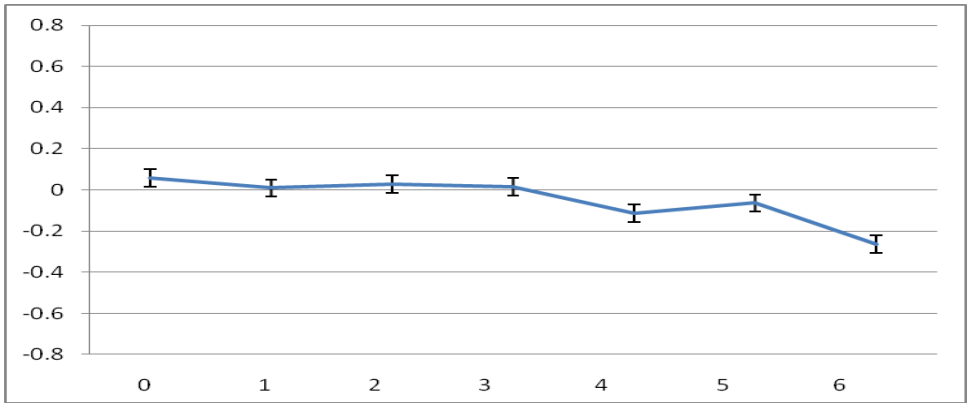


Figure C5 shows the association between the IMR and pro-social behaviour. Please note that for pro-social behaviour a high score indicates positive, i.e. pro-social behaviour. Figure C5 suggests that pro-social behaviour is least affected by the experience of poverty, although it is lowest in circumstances of very high risk exposure.